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A YEARLY REPORT OF THE PROGRESS OF THE GENERAL
SANITARY SCIENCES THROUGHOUT THE WORLD.

EDITED BY

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SURGERY OF THE BRAIN, SPINAL CORD, AND NERVES.

BY JOHN H. PACKARD, A.M., M.D.,
AND
FREDERICK A. PACKARD, A.M., M.D.,
PHILADELPHIA.

CEREBRAL SURGERY.

GENERAL CONSIDERATIONS.

THE conditions of the brain suitable for operative interference have been discussed by Osler.³⁹ Tubercular growths are not suitable, being rarely solitary, and because of the involvement of other parts. Gliomata, when not vascular and rapidly growing, admit of ready removal. Sarcomata and carcinomata are usually surrounded by hyperæmic and softened brain-substance. Cysts are rare in this country, but the conditions in them are favorable to operation. Fibromata of the membranes are the most amenable of all growths to surgical treatment. Abscess offers a much more hopeful field than any form of tumor. Intra-cerebral hæmorrhage, not traumatic, Osler regards as entirely outside the province of the surgeon. Epilepsy has afforded some brilliant triumphs. It is suggested that in simple hydrocephalus, slow drainage, with pressure, might be followed by good results if applied early.

The extension of the applicability of trephining in the relief of internal brain-lesions is strikingly shown by the report recently made by Lucas-Championnière to the Paris Académie de Médecine²⁵ as to the operations of this kind done by him.

The subject of shock attending operations on the central nervous system has been discussed by Dercum.⁹ He thinks patients should always be prepared for such procedures by preliminary rest for several days or a week, and perhaps by massage, faradization, and forced feeding. In inducing anæsthesia, a minimum quantity of ether should be used, and, when it is

complete. $\frac{1}{10}$ grain of strychnia (6 milligrammes) should be injected hypodermatically. The operation having been finished, the patient should be transferred to a previously-prepared hot-water bed, the head being kept lower than the body. Should shock continue, digitalis and atropia are to be given hypodermatically, and at the same time 15 to 20 grains (97 centigrammes to 1.30 grammes) of musk, suspended in thin mucilage, may be thrown into the rectum. Strong black coffee may be employed instead of musk. Dercum regards ammonia as of little value. Alcohol would answer well if retained by the stomach, but for hypodermatic use is inferior to digitalis.

TUMORS OF THE BRAIN.

M. Allen Starr⁹_{Jan 12} has classified and investigated 300 cases of brain-tumor in patients under the age of 19 years. He found that the proportion of males to females affected was 3 to 2. In regard to the variety of tumor, he found over one-half to be tubercular (many of them multiple), glioma and sarcoma coming next in frequency, each numbering about one-tenth of the total number. In 34 cases of sarcoma only 4 were accompanied by growths in other parts of the body. The gliomata were usually seated in the gray matter. In regard to glioma, he draws attention to its liability to produce apoplectiform attacks, or to show exacerbations owing to its high vascularity, and believes these very vascular tumors to be unfavorable for operation. As to their situation, about one-third were in the cerebral axis (basal ganglia, internal capsule, corpora quadrigemina, crura, pons, and medulla), and were therefore not within the reach of operative procedure. Of the 300 cases 96 were of tumor of the cerebellum,—a much greater proportion than is seen in the case of adults. The prominent symptoms presented by those suffering from cerebellar tumors were vertigo, vomiting, tenderness over the occiput, cerebellar ataxia, and, in some cases, paralysis of the fourth nerve, which was always upon the same side as the tumor. He cites 3 cases of cerebellar tumor, all of which died within forty-eight hours after the performance of operation. He concludes that in about one-third of the cases a cerebellar tumor can be reached, that the operation is essentially exploratory, and that it is much more dangerous than when the cerebrum is the seat of disease.

He records fifty-six tumors of the cerebral cortex and centrum

ovale. In order to determine the possibility of localizing during life, and the possibility of removing them when located, he analyzed 40 such cases. In 13 (all in the central convolutions) the tumor could have been located and removed except in 3, where the tumors were extensively-infiltrating gliomata. In 6 of the 40 cases examined a more careful study could have localized the lesion, and in 5 of these the tumor could have been removed, the sixth being multiple. In 21 of the 40, localization was impossible, 1 case in the optic thalamus and 1 in the lateral ventricle giving rise to deceptive localizing symptoms. In 19 of the 40 cases an operation was indicated, and in 16 would have been successful. In 16 cases of subcortical tumor diagnosis was impossible and operation not feasible. The final result of this investigation is that out of 56 cases 16 could have been operated upon, out of 300 cases of brain-tumor in children only 19 warranted operation, and in only 16 could it have been successful. Of these 16, 3 were gliomata, 1 an echinococcos cyst, 10 were tubercular, while in the remaining 2 their nature was not determined. Out of the series of 300 there were only 6 tubercular cases that were proper subjects for operative interference.

Lampiasi,⁸⁴_{May 19} in the case of a child of 2 years, presenting optic neuritis, exophthalmos, convulsions, and other pressure signs, made an exploratory trephining without accomplishing anything. The child died a little more than four days after operation, there being found at the autopsy a solitary egg-sized tubercle in the left lobe of the cerebellum, with great thinning of the wall of the ventricle.

George J. Preston²⁴²_{Apr.} records the case of a male, aged 36, who, eight months before coming under observation, began to suffer from pain in the back of his head and neck, and from staggering in walking. There was marked mental hebetude, with almost total loss of the senses of sight and hearing. No ophthalmoscopic examination of the eye-grounds was made, but it is stated that the pupils were moderately contracted, almost insensible to light, with slight nystagmus. There was no paralysis or loss of sensation, but muscle-sense was diminished. Reflexes were all present, but diminished; unless he was supported he fell backward, whether with opened or closed eyes. He had pain in the back of head and neck, intensified by percussion. He died suddenly. At the autopsy

there was found an egg-sized tumor, of firm consistence and bilobed, springing from the posterior portion of the corpus callosum, attached to both falx and tentorium, and pressing upon the middle lobe of the cerebellum and flattened corpora quadrigemina. The tumor was found to be a glio-sarcoma.

H. Fischer, of Breslau, ¹¹³_{Oct.} before the Thirteenth German Surgical Congress, reported the case of a man, aged 37 years, who was well until January, 1887, when he had a severe attack of dizziness followed by a convulsion. From that time on, the right arm remained weak and its sensation lessened. Complete paralysis of the arm was present in the fall of 1887, and he suffered from severe paroxysmal headache on the left side. The diagnosis of tumor in the left precentral convolution was made. Iodide of potash and other remedies proved entirely ineffectual. The symptoms slowly and continually increased. On the 2d of June slight aphasia (motor) existed. Consciousness was unclouded. No paralysis about the face. The right arm was decidedly paralyzed in all groups of muscles—flexors, extensors, supinators, and pronators about equally. All qualities of sensation diminished (in arm). The right leg was weaker than the left and dragged a little in walking. Operation of trephining June 4th. By the rules laid down by Horsley the precentral convolution was readily found. Still, examined in every way, no trace of the tumor could be found. He thereupon tamponed with iodoform gauze without replacing the button of bone. The patient experienced great relief from the operation. Though the motor speech trouble had increased, the headache was gone, the arm-paralysis was less, and the convulsions ceased. At the end of November he began to complain again. The paralysis of the right arm and leg increased. Characteristic epileptiform convulsions, as described by Jackson, occurred almost daily, and the disturbance in speech became more evident. During the severe attacks the patient complained of a stopping of the left nostril, and finally in these lost consciousness. As the first operation had given him great relief, he urged its repetition. On December 20th the skull was opened at the point of previous operation. Upon penetrating the brain-substance a red, lobulated, wedge-shaped tumor soon bulged up. Its base reached far into the brain-mass toward the right (beyond the trephine-opening). He succeeded with his fingers in shelling out

the tumor from the brain, although it continually broke off on pulling. Hence it had to be removed piecemeal, and severe hæmorrhage resulted. The growth was also firmly adherent to the dura. After the operation the hole in the brain was plugged with iodoform gauze, and a lightly-compressing bandage applied. The patient was at first rather weak, but soon recovered, and all manifestations were disappearing. Two months later, however, he began to complain again, and now a tumor grew out through the trephine-opening. No further operation was undertaken, and he died comatose on March 20th. The autopsy showed that the tumor in the brain had been completely removed. The recurrence started from the dura. It was a vascular round-celled sarcoma.

A case of Donald Hood's ⁶_{Sept. 21} is marked by a peculiar coincidence illustrating the difficulties besetting the positive focal diagnosis of cerebral lesions in every case. The patient fell, receiving a blow upon the side of her head. A few days later she began to have squint, diplopia, increased knee-jerks, staggering gait, and inability to stand with the feet approximated. Exploratory trephining and puncture with an aspirating needle was performed without result. Death occurred two days after operation, and at the autopsy there was found a tumor of the pons.

At the Northumberland Medical Society ²_{Oct. 20} a woman aged 32 years, who had been trephined for cerebral tumor, was exhibited by Limont. She had been confined of her fourth child fourteen days when she became unconscious. On recovery from this she had numerous convulsions, which always began in the right arm; speech, too, became affected. The case was diagnosed as one of cerebral tumor or abscess; and Limont having mapped out the motor centres of the brain by Thane's method, Page trephined, removing a large part of a tumor which Limont regarded as a glioma. For some time the patient did well, and recovered the use of the arm and speech; but latterly the growth had increased, and was now a pulsating mass of considerable size.

H. C. Wood ¹¹²_{Apr.} fully reports 2 cases of cerebral tumor, both showing homonymous hemianopsia. Upon one of them trephining was performed. After discussing the localization of brain-lesions by means of the symptoms relating to the eye and vision, Wood proceeds with the history, in detail, of the case upon whom operation was performed. He was a clergyman who, in 1885, began

to have spells in which he became giddy and lost himself for a minute. This continued until June, 1886, when he first fell in an attack. Prior to his consulting Wood he had had but two convulsive attacks; he had had no headache, and the only aura was giddiness. The field of vision was at that time normal, as was also acuity of vision. There were no marked changes in the eye-grounds save some small areas of fatty change in the choroids. In the fall of 1888, severe headaches occurred and he complained of loss of mental power, with inability to concentrate his thought. The headache was violent and paroxysmal, seated over the eyes, and apt to occur in the early morning hours. Double choked disks were then found, and the fields of vision were concentrically contracted. In January, 1889, left lateral hemianopsia was present. The pupillary reflexes were sluggish, but preserved. Wernicke's hemiopic pupillary reaction was not present. Hippus was also present. There was disturbance of equilibration, with loss of coordination. A tumor of the tentorium, producing both upward and downward pressure, was diagnosed. Shortly after this the right eye became totally blind; the left eye showed still greater diminution of the remaining half-field than was present at the prior examination. Slight increase of the loss of power of equilibration was also noted. There was no involvement of any of the special senses but that of sight. On February 11th, Agnew trephined over the right occipital lobe at its lower internal angle, the position of which was previously determined by Reid's lines. The trephine was applied so as to avoid, if possible, both lateral and longitudinal sinus. Before the button of bone had been removed, one of the teeth of the trephine had nicked the lateral sinus, from which free hæmorrhage occurred, which was controlled by tamponing with gauze. A second button was removed, and the intervening bone removed by the rongeur. No tumor of either the exposed cortex or tentorium could be felt, but as the brain bulged considerably the cuneus was incised, and there was found to be a cystic tumor beneath the gray matter, which was removed. The operation lasted an hour and ten minutes. The patient regained consciousness and rallied somewhat after the operation, but died on the evening of the same day. At the autopsy there was found, occupying the right second, third, and part of the fourth temporal convolutions, a large tumor which extended at

least 2 inches (5 centimetres) into the brain-tissue, nearly the whole length of the temporo-sphenoidal lobe antero-posteriorly. The uncinate convolution was free. In the cuneus there was a large patch of hæmorrhagic softening. With such involvement of the temporal lobe, the preservation of the sense of hearing is remarkable.

Carl Hafner⁴_{Aug.5} reports the case of a man aged 30 years, who in September, 1883, received several blows upon the head, from which he slowly but apparently entirely recovered. In November, 1887, he had headache, radiating forward from the nape, the attacks of pain lasting sometimes for four or five weeks. They were accompanied by giddiness, with occasional vomiting on rising quickly. Vision was impaired in the left eye; speech and hearing were unaffected. He could not walk at night owing to a feeling as though the ground was being taken from under him. There was no history pointing to lead or syphilis as having any causative relation to his trouble. On examination, the pain was found to be located in the anterior half of the left parietal region, while in the vertex there was a point of tenderness on percussion. The left pupil was larger than the right, both reacting well to light. Vision and color-fields and power of accommodation were normal. There was some fullness of the veins of the fundus. The pulse was slow, 54 per minute. Knee-jerks were normal and station good. Both sensation and motion were normal, but there was subjective sense of weakness in the arms. Tumor of the cerebellum was diagnosed. The patient died suddenly, and at the autopsy there was found a tubercular tumor of the left cerebellar lobe, involving the cerebrum and the tentorium, which was adherent to the left lobe of the cerebellum.

P. C. Knapp and E. H. Bradford⁹⁹_{Apr.11} report a case of tumor of the brain: removal, death. Age 32, married, florist. Negative family history. At the age of 12 years he fell with his head against a curbstone, walked home dazed, and had seven convulsions the next afternoon, but was well the next day. Beginning in May or June, 1886, he had nausea and vomiting for two or three months. Recovery from this was complete. Both hands became stiff and weak in the beginning of 1887. Shortly after, he had vertigo. In March he had a convulsion. He was found on the floor, unconscious, with a general convulsion of all the limbs,

the left arm being chiefly extended and abducted. Slight motor impairment of the left hand and leg followed. Soon there was left hemiplegia, with exaggerated reflexes of the same side. Diagnosis, cerebral tumor. Stupid after each convulsion. Attacks begin with a tingling in the left arm and a numb feeling in the wrist; the hand is rapidly extended and flexed; then the arm is flexed and extended at the elbow, after which he becomes unconscious. During the seizure his eyes roll up and there are convulsive movements of the shoulder, followed by either convulsions of the entire body or the left arm only. When waiting long on a customer, a tired feeling passes up the back and spreads over the head, when objects grow dark, and he feels dizzy and suffocated, and has to go into the fresh air. These attacks pass away in a few seconds if he sits down. Occasionally he has severe attacks of head pain that have to be relieved with morphine. His memory has become defective for past events. Speech is noticeably deliberate. For some time he has had "imaginings,"—ideas that he was in various places,—lasting two to five days. Has double optic neuritis, and the tactile sensibility of the face is diminished on the left, while the masseters seem to contract less strongly. Diminished tactile sensibility of the whole left side, most marked in the forearm. Is uncertain as to the position of the left arm or leg when eyes are closed. The abdominal, epigastric, and cremaster reflexes are absent on the left and present on the right; the plantar reflex exists on both sides, but is more marked on the right. There is such swelling of the disks as to require the addition of a $+\frac{1}{12}$ lens to overcome it. The sensibility to cold is diminished in the left wrist, and the tactile sensibility of the left side of the face is not so good as on the left side of the neck. A tumor was believed to be in the right hemisphere, involving chiefly the centres for the wrist and hand in the ascending frontal and parietal gyri, opposite the middle of the second frontal gyrus. He was somewhat uncertain whether his ear or nose was touched. There was marked papillitis in both eyes. Cerebral thermometry showed the left side of the head to be a little warmer than the right, but it was half a degree higher over the supposed site of the tumor than the corresponding site on the other side. Patient became very weak while the scalp was penciled to mark the convolutions. The markings that were made with silver nitrate resulted in destruction of the epiderm

because of too strong a solution. The marking of the scalp was done by the methods of Broca, Reid, and Horsley. Operation: This was done under the strictest antiseptic precautions. A large semicircular incision, with the concavity downward and backward, was made over the middle of the tumor-site, and the flap reflected backward. A $1\frac{1}{4}$ -inch (31 millimetres) trephine was applied in two adjacent points, and $\frac{1}{2}$ inch (13 millimetres) was removed with a saw and forceps. The dura was divided $\frac{1}{8}$ inch (3 millimetres) from the margin of the bone. The gyri were somewhat flattened and fluctuating. The cortex was incised and a probe inserted, but without encountering any resistance. The incision was enlarged and the finger inserted and carefully pushed downward. At a distance of $\frac{1}{2}$ inch (13 millimetres) from the cortex, a difference in consistence was detected, and found to extend downward and backward toward the cerebellum till the full length of the finger was inserted. The whole growth was turned out of its bed with the finger. There was no cerebral hæmorrhage. The pulse, which had been very weak, improved slightly after the removal of the growth. The pieces of trephined bone had been kept sterilized at blood heat, were replaced after the brain-cavity had been irrigated with warm, sterilized water, and a drainage-tube was inserted. The dura had retracted so much that it could not be stitched, and the skin flap was closed. The patient died three-quarters of an hour after the operation, from heart failure. No autopsy was allowed. The tumor had occupied the exact place in which it was supposed to be. It weighed $35\frac{3}{4}$ grammes (1 ounce, 1 drachm), and measured 7 by 4 by 3 centimetres (2.75 by 1.60 by 1.18 inches). It was a mass of cheesy centres, surrounded by a thin, irregular layer of firm, yellowish-brown, slightly-translucent tissue. It was composed of granular detritus, connective tissue, and giant, epithelioid, and round cells, containing tubercle bacilli.

L. S. Pilcher, of Brooklyn, ⁹⁶_{Mar.} besides relating an extremely interesting case of brain-tumor not found on operation, gives excellent critical remarks upon his operation, and a brief *résumé* of some of the now widely-known cases of cerebral surgery. His patient was a man, aged 33, who gave a history of being thrown from his carriage in the spring of 1882. No immediate effects of importance were remembered. In about a year he became irritable, childish, and apathetic. In the autumn of 1884 he had a

general convulsion, during which there was complete unconsciousness. For about a year following this first convulsion he had repetitions about once a month, and in the intervals attacks of *petit mal*. He then took some patent medicine, and remained free from the severer attacks until June, 1888, although subject to frequent attacks of *petit mal*. Since the last-named date he had had frequent attacks of the latter, with slight attacks of a major character. He was very apathetic and listless, but had no delusions. His intellect was impaired. He had severe frontal and vertical headache. There was no nausea or vomiting. The bowels were constipated, and both urine and feces were passed wherever convenient, regardless of cleanliness. Ophthalmoscopic examination showed choked disks. The tongue was protruded straight, and there was no facial palsy. There was slight stiffness on the right side. The right hand was stronger than the left (35 to 30). There was tremor of the right hand, intensified by movement. The knee-jerks were increased, the right most so, but there was no ankle-clonus. There was no inco-ordination, or ataxia, but on walking with the eyes closed he bent to the left. The pupils were equal, and responded to both light and accommodation; visual field was not ascertainable. Hearing unimpaired. As to the absence or presence of agraphia, the imbecility prevented any accurate knowledge. There was no aphasia. During observation an attack came on. There was no cry; the pupils were dilated and the eyes turned to the left. The right leg was extended, right hand closed, and forearm flexed. The fingers could be unbent and the arms straightened. Consciousness was not completely lost. The face did not change color. After lasting for ten minutes the attack passed off; he stood up, said he felt all right, but did not remember what had occurred. He was put upon ascending doses of potassium iodide without any benefit. Cerebral tumor having been diagnosed, the operator decided to trephine over the point of former external injury, and for the following reasons: 1. Injuries of the skull are a recognized cause of the development of diseased growths in the brain. 2. The location of such tumors usually corresponds to the site of the previous skull injury. 3. The patient, except as regards his animal functions, was already practically dead, and the hopelessness of the prognosis made justifiable the assumption of extreme risks, provided they were attended with

the slightest possibility of advantage to him. On November 9, 1888, a curved incision, with convexity upward, was made, beginning in the mid-temporal region of the left side, and was carried upward and backward to within $1\frac{3}{4}$ inches (44 millimetres) of the sagittal suture, then downward and backward so as to make a flap $\frac{1}{2}$ inches (10 centimetres) across its base, and $\frac{1}{2}$ inches (10 centimetres) from above downward, at the centre of which was the seat of injury. Hæmorrhage was controlled at the edges of the flap by pressure-forceps; from scalp-edges by rapidly-applied sutures, forming temporary mass-ligatures. The periosteum was included in the flap, which was then reflected downward, exposing the denuded cranial wall. A 1-inch (25 millimetres) trephine was applied to the parietal bone at the point which lay under the scalp-cicatrix, which point had been marked by punctures with a drill previous to the reflection of the flap. The cranial vault presented no depression nor other sign of previous injury. The first button of bone having been removed, a second similar one was removed behind it, and on the same level with it. The opening thus made was further enlarged by the removal of a $\frac{3}{4}$ -inch (19 millimetres) button of bone above and below the points of intersection of the two first trephine-openings. Projecting angles were removed by a rongeur. The buttons of bone were kept in warm sterilized water. The dura appeared to be normal, but bulging, and without pulsation. It was divided throughout the lower three-fourths of the circumference of the opening, and the flap reflected upward. The brain-substance bulged with such force as to tear the cortical matter against the margin of bone. The presenting brain-tissue being normal, the opening was enlarged toward the front by another trephine-opening and the rongeur. The dura was reflected as before. The opening in the skull now measured 3 inches (76 millimetres) antero-posteriorly by $2\frac{1}{2}$ inches (63 millimetres) from above downward. The brain bulged forcibly through the opening. No tumor could be detected by the finger or by the exploring trocar and needle. The projecting cerebral mass could not be returned to the cranial cavity, nor could it be covered by the dural flaps; it was therefore sliced off at a level with the bone. The dura was united by catgut sutures, and the four buttons of bone placed on it. Two fine rubber drains were inserted, and the wound closed and covered with a sterilized gauze dressing. Time

of operation, two and a half hours. There was much shock. (Edema of the lungs developed, and he died during the night following the operation. At the autopsy (five hours after death), one of the replaced buttons of bone was found adherent to the dura mater. There was great flattening of the convolutions of the anterior half of the left hemisphere, and that region of the brain was occupied by a non-encapsulated, translucent mass, with broken-down centre. In the subarachnoid space at the base was a large blood-clot, running into the left Sylvian fissure. The tumor was a glioma. The author, in commenting upon his case, considers that the hæmorrhage into the subarachnoid space had much to do with the patient's death, and that it was caused by the sharp needle used for exploration injuring a branch of the Sylvian artery.

ABSCCESS OF THE BRAIN.

Cameron Kidd,^{6 Feb. 2} reported a case of double cerebral abscess upon which trephining was performed over the abscess in the frontal lobe and the pus evacuated. The patient died on the fourth day, and on post-mortem examination there was found a second abscess in the right temporo-sphenoidal lobe containing nearly 2 ounces (62 grammes) of pus. There was no disease of the petrous portion of the temporal bone, and it is difficult to explain the presence of the second abscess. The only discoverable cause for the presence of abscess in the frontal lobe was the fact that three years before the patient had received on the forehead a kick from a horse. The scar of this injury was present, and it was over it that the trephine was applied, the pus lying below it. The frontal bone was sound, and the internal table had evidently not been injured. The only marked symptoms prior to operation were the occurrence of right-sided convulsions with slight rigidity of neck and stupor. V. Fritsch^{113 Apr. 7} has reported the case of a 5-year-old boy who fell against a projecting nail, receiving a wound of his head that bled but little. Three days later general convulsions, with frothing at the mouth and strabismus, appeared. His physician opened a superficial abscess, but the wound refused to heal. He was brought to the hospital, and there was found in the region of the lambdoid suture upon the right side a wound through which a probe could be introduced for a distance of 7 centimetres (3 inches). The wound was enlarged, and the skull

opened by hammer and chisel. There was found a minute hole in the dura, which was enlarged, and from which 150 cubic centimetres (5.07 fluidounces) of pus was evacuated. In about a month left hemianopsia appeared, followed in about sixty days by convulsions and fever, with, on the next day, spasm of the left half of the face. He eventually recovered, and for five months had remained well.

Thomas W. Kay⁶¹_{Feb. 16} reports the case of a negro, aged 28, who two years before had received a violent blow upon the head. For six months prior to his applying for treatment he had had an offensive discharge issuing from three sinuses over the right parietal eminence, at the bottom of which was found necrosed bone. The sinuses were connected by incisions, and a mass of the whole thickness of the parietal bone, measuring $2\frac{1}{2}$ by $1\frac{1}{2}$ inches (63 by 37 millimetres), was removed, following its removal nearly 2 ounces (62 grammes) of very offensive brain-substance escaped. In three weeks the cavity was nearly filled and he was discharged from the hospital. There were no paralytic or other cerebral symptoms, in spite of the loss of so much brain-substance. John H. Morgan²_{Mar. 9} reported to the London Medical Society the following case of cerebral abscess and trephining: Boy, aged 9, fell against projecting pegs, receiving a triangular scalp wound. He was insensible on admission. On fourth day had a fit, leaving left leg and arm paralyzed. On searching, a depressed fracture the size of a shilling was found far away from the wound, 2 inches (5 centimetres) below the median line and directly above the ear. This was raised with the aid of the trephine, and through the torn dura thick pus exuded. The cavity was cleaned, the marginal granulations scraped with a spoon, a tube was inserted, and the dressing completed. At the end of ten days the granulations became puffy, but the free use of iodoform corrected this, and healing went on uninterruptedly. The other symptoms gradually disappeared. The points of interest in the case were: 1. The distance of the depression of bone from the site of the scalp wound. 2. The freedom with which the abscess and its surroundings were successfully dealt with, and the treatment of the exuberant granulations with a powerful antiseptic. 3. The general symptoms of brain disturbance shown by the distribution of the spasms indicates the existence of a diffused cerebritis, although the parts primarily involved were undergoing rapid repair.

Jordan Lloyd²_{Mrs.} showed to the Birmingham County Branch of the British Medical Association a man aged 29, upon whom he operated in October last for cerebral abscess secondary to chronic middle-ear disease. At the time of operation the patient was almost moribund, and the only localizing symptom present was an aphasia of a few hours' standing. The skull was trephined 1 inch (25 millimetres) above the left auditory meatus, and all the tissues down to the brain were healthy. An abscess containing about 4 ounces (124 grammes) of fetid pus was opened in the temporo-sphenoidal lobe, and the patient made a practically uninterrupted recovery.

Terrillon⁷_{C.} reports the case of a boy, aged 13 years, who presented at first symptoms of typhoid fever accompanied by a slight headache. Soon a fixed, severe pain in the left temple supervened, and a tumefaction appeared there. Delirium set in, with right brachial monoplegia, facial palsy (the orbicularis alone escaping), and aphasia. Terrillon incised the scalp in the affected area, found the bone denuded, and applied a trephine over the mid-motor region. The dura mater was found to be thickened. Three exploratory punctures with an aspirating needle were made, the last one striking pus. The dura was incised and the cerebral abscess cleaned out. All of the paralytic symptoms disappeared immediately. The patient did well until the onset of a meningoencephalitis, which produced death.

J. T. Eskridge, of Denver,²¹²_{June} reports a case of cerebral abscess, trephining, and death. The patient, a male aged 30, had typhoid fever in September, 1887. He had recovered by November, except for a purulent discharge from the right middle ear. On November 20th he became delirious after a period of anorexia, feverishness, and headache, with irritability of temper. When first seen by Eskridge he had been delirious for two or three days, with delusions of persecution, and fever. There was also palsy of the left forearm and paresis of the left angle of the mouth. The tongue deviated to the left. There was no aphasia. There existed an abscess in the cellular tissue of the left forearm. The diagnosis arrived at was abscess of the upper portion of the lower third of the ascending parietal convolution. Under very unfavorable conditions the trephine was applied over the point where the abscess was presumed to be. Beneath the surface of the brain, at a depth

of $\frac{1}{8}$ to $\frac{1}{4}$ inch (3 to 6 millimetres), an ounce of pus and broken-down brain-matter was evacuated. The cavity was wiped out, a piece of sterilized sponge inserted, a subcutaneous drainage-tube employed, and silk sutures used to unite the external wound. There was early and marked improvement in his mental condition and in the degree of paralysis. Five days after operation the temperature rose and delirium returned, accompanied by stupor. The discharge through the drainage-tube had increased and was of very foul odor. Coma increased, and he died nine days after operation, death being preceded by complete left hemiplegia with slight twitching of the right leg. At the autopsy the whole right hemisphere was covered with pus, and there was a large purulent collection within it. There was localized meningitis over the left paracentral lobule (no doubt the cause of the twitching in the right leg noticed shortly before death).

Keetley^{6 Sept. 28} reports a case of diffuse intra-cranial abscess, the pus being found between the falx cerebri and left hemisphere, on the anterior and inferior aspects of the frontal lobe, and in the occipital lobe. Two operations had been performed, and twice had multiple punctures been made in various directions, but with negative result, although the brain bulged to such an extent that the button removed by the trephine could not be replaced. Orlow^{69 Mar. 7} gives the details of a very interesting case in which, in a woman 27 years old, a suppurating thrombosis of the transverse (lateral) sinus was successfully treated by trephining.

TREPHINING IN GENERAL.

A curious statement is made by Whittell^{147 June} as to the frequent practice of trephining for fractures of the skull among a tribe of Arabs in Algeria. These people are very quarrelsome and always fighting with sticks. The operation is performed with small flat saws. Out of thirteen skulls found in a burying-place six had been trephined.

It may be noted that the substitution of the chisel for the trephine seems to have found very general favor among the surgeons of the continent of Europe, and especially in Germany. Roberts^{119 Apr.} proposes a "segment trephine" for cases where, from the unequal thickness of the bone in the area of the operation, a deeper cut is required in one portion of the circle than in another.

It seems as if there would be great danger of tearing the membranes or the brain itself by the corners of this instrument, which is simply, as its name implies, a trephine with only about one-third of its crown complete. He advocates also the use of a solid metal plug, fitted within the head of the trephine, to carry the centre-pin; thinking that this, by allowing the stem to be made solid, will facilitate keeping the instrument aseptic.

An interesting case is reported by Thiéry⁵⁵ in which a woman, aged 49, sustained contused wounds on both sides of the head, one exposing the bone. Coma, at first deep, passed off, but recurred again on the fifth day, when trephining was performed at each point of injury, death ensuing in a few hours. An extensive fracture on the left side was found at the base of the skull. Congestion of the whole of the pia was noted, but no meningitis; there were subdural effusions of blood in the left speno-temporal and right temporo-parietal regions, and complete attrition of the cortex of the right speno-temporal lobe, involving almost the whole thickness of the outer wall of the cornu of the ventricle. This latter lesion seemed to explain an elevation of the patient's temperature to 104° F. (40° C.), observed before the operation and again just before death.

Several other cases are detailed by Thiéry in connection with this one, illustrating the effects of injuries of the skull and the difficulty of determining the indications for interference.

Another case of double trephining is reported to have occurred in the practice of Kocher.² Here the operation was performed in order to relieve symptoms produced by increased intra-cranial pressure. An exact localization of the tumor was impossible, the symptoms being limited to choked disks, deterioration of vision, headache, and unsteady gait. Two openings were made in the skull, one posteriorly, on the right side, just below the tentorium cerebelli, the other anteriorly, on the left side, on the edge of the hairy scalp. Extreme tension of the dura mater was found at both points. Posteriorly, a considerable cerebellar hernia formed. It was at once removed with a sharp spoon and the wound closed with sutures. Anteriorly, a small glass drainage-tube was inserted on account of slight bleeding from veins of the pia. The wounds healed by first intention in forty-eight hours. Four days after the operation congestion of the disks disappeared entirely, and the sight of the

left eye considerably improved. The right eye, however, showed no amelioration, marked atrophy of the disk having already developed. The patient's general state also improved, his gait became steadier, and headache disappeared. On examination about seven weeks after the operation the improvement still continued.

R. Jaksch⁸⁴_{Sept. 21} enumerates the various methods adopted for the filling of trephine-openings in the skull as follows: 1. Re-implantation of the trephine-button (Macewen, Adamkiewicz, Guérin). 2. Transplantation of pieces of bone taken from other parts of the patient (Seydel). 3. Transplantation from one animal to another of the same kind (Adamkiewicz, Guérin). 4. Transplantation to an animal of different kind (Guérin). 5. Transplantation from an animal of different species (R. Jaksch). The last-named case was that of a soldier, aged 22, who had a depressed, comminuted fracture of the right parietal bone. The opening was cleared, leaving a hiatus of 3 centimetres (1.18 inches) in diameter. It was antiseptically dressed. In eight days the skull of a living goose was laid bare, the head was cut off at a single blow, the skull was disinfected with ether and sublimate solution, and the whole placed in a 2-per-cent. carbolic solution at a temperature of 38° to 40° C. (100.4° to 104° F.). The calvarium was removed while in this solution and divided into eight pieces, which were laid on the granulating dura. An iodoform dressing was applied and retained for ten days, when it was removed, and the bone-plates looked pink. In another eight days they showed granulations on their upper surfaces. A week later the whole surface was granulating. The cure was complete in less than two months.

Caird³⁶_{Nov.} has reported the case of a soldier, aged 27, with compound depressed fracture on the right side of the head; the trephine disks were cut up in accordance with Macewen's method and replaced on the dura, and the wound sewed up. The wound healed without trouble, and the patient made a good recovery, including complete bony union.

Gerstein⁶⁹_{July 11} says that in a case in which it was necessary to remove a large portion of the skull it was preserved in a bichloride solution and re-implanted, but not until some parts had been nipped off on account of its being too large to fit in the opening. Healing was perfect, and some time afterward the patient died

of pneumonia, when examination of the skull showed that a bony union had resulted wherever the implanted bone had been in contact with the skull margin.

Küster⁶⁹_{Mar. 22} has reported a case of complete union of the replaced button of bone removed in an exploratory trephining. In discussing this case, Bidder thought it was too early to be confident that there would not be absorption, or perhaps necrosis, of the button, which seemed to him to yield somewhat to pressure with the finger.

A new method of dealing with losses of substance of the skull from injury has been adopted by Seydel.²⁴⁵_{Aug. 7} By the kick of a horse a patient had had an oval portion of the parietal bone, nearly 2 inches (5 centimetres) long and over an inch wide, completely shattered. On the twelfth day, the symptoms being all favorable, Seydel chiseled from the inner side of the tibia a superficial plate of suitable size, with its periosteum, laid it in a weak solution of salt, divided it into six or eight equal portions, and laid these, like a mosaic, on the exposed dura. Complete union took place. The wound in the leg healed readily, without necrosis of the bone.

In view of the fact that even after the removal of large portions of the skull-cap the opening left is quite securely healed over and adequately protected by fibrous tissue, the advantage gained by the re-implantation of the trephine-button, or by the transplantation of another portion of bone, can hardly repay the trouble and delay expended in the process. I have myself recently had to extract a button replaced after trephining by another surgeon, it having remained necrosed and acting as a foreign body. Moreover, these operations are often resorted to for the relief of pressure on the brain, and it would seem as if the replacement of the removed bone would therefore be unphilosophical in theory, if not in obvious effect.

Zeidler¹¹³_{June 53} records a number of cases of trephining for head injuries, and gives a number of conclusions as to the performance of this operation. He thinks that cerebral symptoms, in cases of head injury, indicate trephining only when signs of intra-cranial hæmorrhage are present. In simple fractures of the skull unaccompanied by symptoms of intra-cranial hæmorrhage, trephining is not indicated. Depression of fragments of bone cannot, of itself,

be considered as an indication for trephining. The object of primary trephining, which should be performed as early as possible, is either asepsis or the arrest of hæmorrhage. Secondary trephining is indicated even when symptoms of commencing meningo-encephalitis are present, and in some cases will abort the inflammatory process. Trephining is indicated in cases of depressed fracture, in which the fragments irritate the brain and provoke epileptoid seizures. In fractures opening into the sinuses the bleeding should be arrested by the antiseptic tampon and not by suture. The term "trephining" should only be applied to the operation upon the uninjured skull, the term "debridement" being a better designation for the operative measures employed in complicated fractures of the cranium.

Experiments on dogs and rabbits have led Spijarnyi⁹⁶_{May} to conclusions essentially in accordance with the above.

EXPLORATORY TREPHINING.

A case is reported⁸_{July 4} in which exploratory trephining was performed on a boy, aged 9, who had had for two years cephalalgia and other brain symptoms, and had then, in addition, convulsions, with amaurosis and exophthalmos. A fine trocar was introduced into the lateral ventricle, and some serum escaped. Marked relief was given for four days, but then death ensued, and an autopsy showed a solitary tubercular mass, the size of an egg, in the left cerebellar lobe; the lateral ventricle was distended at the expense of the cerebral hemisphere, and there were other less important lesions.

Souchon¹²_{May} proposes the drilling of "capillary" holes through the skull for the purpose of exploring for cysts or tumors, or for the aspiration of effused blood. From experiments on dogs he thinks such a procedure might be resorted to with safety in man.

INJURIES OF THE BRAIN.

Barrow²²_{Oct. 16} reports an interesting case of compound, comminuted, depressed fracture of the skull, with laceration of the brain. A man, aged 26, was kicked in the forehead by a horse, and remained unconscious a few minutes. A wound 2 inches (5 centimetres) long was found 1 inch (25 millimetres) above the right eyebrow. Under it was a depressed and comminuted fracture of the frontal bone. This was elevated, and three or four pieces of the outer and

two or three pieces of the inner table were removed; the latter were loose. The dura was rent in several places. The wound was irrigated with carbolic lotion, the dura was sutured with cat-gut, and the skin likewise. Two days later he had opisthotonos, with drawing up of the left angle of the mouth. He had convulsions that began with twitching of the facial muscles, then of left hand and arm, and subsequently became general. They were clonic in character. At 5.30 P.M. Barrow removed the sutures from the scalp wound, and found that those in the dura mater had given way or been absorbed. A little pus (?) and what appeared to be brain-substance oozed from the wound. Pupils much contracted. The patient intolerant to light, but not to noise. He heard all that was said, and talked about what he heard mentioned in a wandering manner. There was no discharge from the ears nor from the nose. He felt as if his "head had been shivered in 1000 pieces." There was motor paralysis of the left arm and of the left side of the face. The convulsions were frequent, but less violent, and were sometimes confined to the lower jaw and left arm and hand, the legs only tossing restlessly about; each lasted two to three minutes. The patient was quieter, and the convulsions more restricted to the face and left arm. There was marked retraction of head, but no headache.

On the fifth day he had twitchings of left orbicularis oculi, which spread to the other muscles of the face. When the spasms were severe they involved the extremities, preferably the upper, and especially the left. The next day he grew a little worse, and at last was unconscious. The wound was opened; serous fluid and brain *débris* escaped; a large cavity was felt by the introduced finger, and this caused additional twitchings. The day following, the left arm was still paralyzed. On the eleventh day there had been no convulsions for several days. On the thirteenth the paralysis had disappeared. On the eighteenth day there was a little pus on the surface. One month and six days after operation there were slight twitchings of the face, but they did not recur, and he was discharged cured in two months, less one week, from the time of injury.

A number of cases of brain wounds, with excessive loss of substance, have been reported by Stockwell.⁸⁰ Three of these were saw-wounds, dividing the skull and brain across the sagittal

suture to a depth of 2 or 3 inches (51 or 76 millimetres), and two resulted in complete recovery. Two other like cases, observed by Folsom, of California, and Wallace, of Philadelphia, are referred to; both ended favorably. Another remarkable case of injury of the head by a circular saw, dividing the left parietal bone close to and parallel with the longitudinal sinus, which was partly exposed, is related by Kehr.⁴_{Oct.14} Aphasia and right-sided hemiplegia were marked. Six months afterward, the patient's recovery was very far advanced. Other interesting cases of brain injury are reported by Flothmann³⁴_{Dec.25,'88} and by Allen.⁵⁹_{Aug.10}

Several cases have occurred under my own care at the Pennsylvania Hospital within the last two years, in which extensive comminution of the cranial vault and large loss of brain-substance have been followed by scarcely any symptoms of note after the subsidence of shock.

Other cases of trephining for injury may be referred to, as follows: Godard,²⁴³_{June} Steele,⁶_{June 1} Marwood,²⁶⁷_{Feb.} Fisher,²⁶⁷_{Feb.} Goodhue,¹⁰¹_{Sept.} Von Vamossy,¹¹³_{July 28} Ward.⁸⁰¹_{June} Special mention may be made of an article by Höftmann,⁶⁹_{May 16} containing details of 6 cases in which the symptoms calling for operation were very obscure; also of one by Allen,⁵⁹_{Aug.10} giving reports of 6 cases of trephining where there was no external evidence of injury to the skull.

For lack of space, we can only give the references to a number of other reports of cases of extensive injury to the skull: Runner,¹²³_{Dec.1,'88} Menschel,¹²³_{Dec.1,'88} Ricard,¹⁰⁰_{Dec.18,'88} Mason,⁶_{Dec.22,'88} Fisher,²⁶⁷_{Feb.} Tiffany and Michael,¹⁰⁴_{Jan.26} Barton⁹⁶_{Jan.} Ford,²⁰⁷_{Jan.} Wille,²¹⁴_{Mar.1} Lampiasi and Bendandi,³_{Apr.24} Cox,²²_{May 22} Zinsmeister,⁸_{June 6} Wernicke,³¹⁹_{June 29} Gruss,⁸_{July 18} Keetley, Clarke, and others.⁶_{Sept.21} Bockelmann⁶²_{Aug.22} has recorded a remarkable instance of recovery from prolapsus (hernia) cerebri, following compound fracture of the skull, in a boy 6 years of age.

Cases of gunshot injury of the brain have been recorded by Berry,²⁷²_{Jan.16} Berger,³_{Mar.6} Jones,⁶_{Mar.2} Formad,¹¹²_{July} Woods,¹¹⁵_{Apr.} and Keetley.⁶_{Sept.1}

Allis⁹⁶_{July} gives an account of a case of severe compound fracture of the frontal bone in which he perforated the cribriform plate of the ethmoid in order to introduce a tube and effect drainage downward. He recommends analogous procedures in injuries of other portions of the floor of the cranium. Drainage in cranial injuries, a counter-opening being made for the purpose if necessary, is advocated also by Powers.¹_{Jan.12}

FOREIGN BODIES IN THE BRAIN.

In a case reported by Stimson, ¹_{Apr 24} a man, aged 50, fell backward, striking his head on the pointed end of the handle of a paint-brush, which penetrated the dura and broke off. On the second day he felt badly, and two days later became dazed, with paresis of the left limbs and fever. Six days after the injury he was trephined, a button of rather thin, soft bone removed, and the bit of wood, $\frac{5}{8}$ inch (15 millimetres) long, extracted; an ounce (31 grammes) of pus escaped from beneath the dura. He immediately improved, but had aphasia, agraphia, and right-sided hemianopsia. These symptoms were slowly subsiding at the time of the report. The paresis was to be explained as a pressure effect or as due to spreading surface-inflammation. The wound was on the right side, $1\frac{1}{2}$ inches (37 millimetres) from the median line and $1\frac{1}{4}$ inches (31 millimetres) above the occipital protuberance—almost diametrically opposite the position assigned to the speech-centre. Stockwell ⁸⁰_{Mar} has recorded a case in which the breech-pin of a gun-barrel was driven into the skull of a boy of 20, through the forehead; it was extracted with much difficulty, a counter-opening having to be made in order to dislodge it; there was very great loss of brain-substance, but the patient recovered, and lived nearly thirty years afterward.

An interesting case of cerebral abscess, in which a second operation was required owing to a re-accumulation of pus from the presence of unsuspected foreign body, is recorded by J. W. Wright, ⁵⁹_{Sept 21}. The patient was a man of intemperate habits, who, while suffering from delirium tremens, beat his head against the wall of his cell. Multiple abscesses formed under the scalp, and were opened. Over a month later he complained of numbness and weakness in his right hand. Paresis of the right arm and leg and of the right side of the face appeared, and he became at times aphasic. He became comatose with slow pulse. A 1-inch (2.5 centimetres) trephine was applied over the left Rolandic region and the brain exposed. By an exploring-needle 2 drachms of pus were drawn away. A bistoury was then used to further open the abscess-cavity, and a drainage-tube was inserted, about 8 ounces (249 grammes) of pus being evacuated. On the next day the patient pulled the tube out, but in spite of that the wound healed and his paresis disappeared. He did well for two months, when

paresis re-appeared and he was again operated upon, and a little pus found. He died two days after the second operation. At the autopsy it was found that a wire-nail 2 inches (51 millimetres) in length had been driven through the skull into the brain, the head of the nail being sunk in the bone. It had entered the left parietal bone close to the sagittal suture, 2 inches (51 millimetres) in front of the lambdoid suture. The point of the nail was in the centre of an abscess in the white substance of the parietal region, involving the post-central convolution. The ventricles were untouched. From subsequent history it was learned that the nail had probably been in the skull for eighteen days before the first operation.

TREPHINING FOR ENDOCRANIAL HÆMORRHAGE.

Several cases of trephining for the relief of endocranial hæmorrhage have been reported. One, by Allingham, ²_{Apr 20} is claimed to be unique in that the blood was effused within the dura, and not between it and the bone. It was that of a man aged 40, who, while half drunk, fell off a street-car. On the fifth day he had some signs of compression. On the next day he had a convulsion, beginning with an upward movement of the mouth and a clonic spasm of the eyelids; then the neck was drawn to the right, and the left arm and leg passed into a condition of clonic spasm. Frequently-recurring attacks affected only the neck and face. On the sixth day the right Rolandic fissure was exposed through the temporal muscle; the posterior branch of the middle meningeal artery was exposed, but neither it nor the dura found injured, though the dura was bulging and pulseless. The dura was incised and 3 ounces (93 grammes) of black blood-clot removed with the fingers and irrigation. The wound was carefully dressed. There were a few slight convulsions during the next few days, and he then made an uninterrupted recovery in two months and ten days. A very similar case, in a man aged 53, in whom, however, there had been an apoplectic attack two years previously, has been reported by Lucas-Championnière ²⁵_{Oct.}; the clot occupied the substance of the ascending frontal convolution.

Another case is reported by Croft, ⁶_{Jan. 10} in which a woman aged 31 was knocked down and kicked by a horse. After some hours she had dextral hemiplegia, and her breathing became stertorous;

she was trephined on the day following the injury through the original scalp wound, located behind and below the left parietal eminence, and $2\frac{1}{2}$ ounces (77 grammes) of black, granular clot was extracted. Another button was taken out in front of the first, and when the entire clot was removed arterial blood was seen to well up from the back part of the wound. An inch (25 millimetres) of bone was cut away in this direction, but no vessel could be found, and an antiseptic-sponge pressure was made, with silk attached to each piece of sponge. The wound was drained, sewed, and dressed. The right leg began to improve in six hours. She was able to recognize her friends on the fourth day. In two months, less one week, she got up for the first time. Much of her stay in bed was due to a wound in her groin. She left the hospital in five months able to care for herself, and has not been heard from since. Croft says his first case, done in 1857, before the days of antiseptic surgery, was a success.

Bellamy ^{June 15} reports a case in which the result was less fortunate. It was that of a man aged 50, who fell from a scaffold. He had collapse, vomiting; was drowsy; left lower face and tongue paralyzed; paresis of left arm; he was irritable; fits set in on the second day, beginning at the left lower angle of the mouth, thence extending to the left face, left hand, and right face simultaneously; turning of the eyeballs to the left, followed by the head, next the left leg, right leg, and right arm; after which he was violently convulsed, bit his tongue, and gradually reversed his eyeballs and head to the right side. On the fourth day, under the strictest antiseptic precautions, and after the right facial centre had been located by Godlee's method, a fracture was found running from before backward; a large trephine was applied and the opening enlarged with forceps, when a large subcranial clot was found and turned out with the finger, and the cavity washed. A **T**-incision into the healthy dura brought to light a subdural clot. A branch of the meningeal artery was found upon further enlargement of the wound and tied, when all bleeding stopped. The wound was dressed, the fits diminished, but the patient died next morning. Autopsy: Brain was lacerated; extravasated blood was found under the scalp in the occipital region; the line of fracture extended downward and backward on the parietal bone. Two other fractures extended upward and forward from the opening;

a thin extra-dural clot was found in the occipital region; there was subarachnoid extravasation over the posterior half of the brain; the convolutions were flattened; the lacerated part of the brain was mostly the superior temporal gyrus; and there was almost complete destruction of the cortex of Broca's gyrus.

TREPHINING FOR EPILEPSY.

The following works, bearing chiefly upon the subject of this part of the article, deserve notice: Delagènière,¹²⁴⁷ von Bergmann,¹²⁴⁸ Lucas-Championnière,¹²⁴⁹ and Péchadre.¹²⁵⁰

A rare case is recorded by Koehler⁶⁹ in which a man aged 33 received a sabre-cut over the left parietal bone. Paresis of the right arm and face and difficulty of speech ensued, and convulsive movements of the affected muscles were noted in the first five days. After two months the man was discharged, with some weakness of the right arm and hand, the tongue being drawn somewhat to the right also. Five weeks later the first epileptiform seizure came on, and after that the attacks recurred at intervals of four or five weeks. The right side was first affected, and then the convulsions became general. Thirteen months after the original injury the site of lesion was determined, the scalp turned back, and the bone chiseled away, removing a thorn-like projection which had pressed upon the dura. This membrane was adherent, but had not been penetrated. At the time of the report, four months later, the convulsions had not recurred, and the nerve-functions of the arm and hand were almost wholly regained. A case closely resembling the above, in a man aged 29, the subject of alcoholism and probably of syphilis, has been reported by Mouisset.²¹¹ Trephining revealed the existence of a hæmatoma beneath the dura, which was removed, and the aphasia and other symptoms passed away. A less favorable result occurred in an instance reported by Allen.⁵⁹ The patient, from an old blow over the right eye, gradually became epileptic, and was trephined at the seat of injury. He had some convulsions afterward, and was forgetful. At his death, two years later, there was effusion into the pia mater all over the surface of the brain. In a case reported by Langenbuch⁴ trephining gave only temporary relief (four months) from Jacksonian epilepsy due to a fall on the head. The patient, a girl 5½ years old, had sustained the fall three years before, and a cyst had formed, which was

emptied. Langenbuch raises the question whether it would not be sound practice in such a case to re-open the wound and to excise the affected portion of the brain-mass. A case is recorded by Fischer⁶⁹_{July 11} in which a man aged 37 was trephined early in June for a supposed brain-tumor, which, however, was not found. In September, Jacksonian epilepsy came on, with return of the former symptoms, and at another attempt in November a round-celled sarcoma was exposed and removed; it was somewhat adherent to the dura, and there was free bleeding. Two months after operation the symptoms recurred, and in March the man died, when an autopsy showed that the growth had been reproduced from the dura.

Péan¹⁰⁰_{Feb. 21} has recorded an interesting case of epilepsy cured by the application of the trephine. The patient was suffering from slight epileptic seizures, the right side being mainly affected and the lower limb more than the upper. During the intervals between the attacks there was some paresis of the right leg. The diagnosis was made of a cerebral tumor, and its localization determined. The trephine was applied, and a fibro-lipoma was found attached to the pia mater. The growth was removed forthwith, but for some days after the operation the convulsive fits continued. Subsequently, however, they entirely ceased, and the patient became quite convalescent. In view of the experience of other cases, one can hardly help thinking that a longer time than two months and a half must elapse without seizures before such a patient can be confidently considered as cured.

Successful results in trephining for epilepsy have been claimed by Wilson,²⁰⁷_{Jan.} Southam,⁶_{Feb. 9} Bendandi and Boschi,⁵⁷_{May 12} Lépine,³_{July 24} Championnière and Letulle,³_{Aug. 21} Williamson and Jones,²_{Oct. 26}

Failures are reported by Wilson,²⁰⁷_{Jan.} Mills and Roberts,¹¹⁹_{Apr.} Lees and Page,²_{Apr. 20} von Vàmossy,¹¹³_{July 25} and Sartorari,²_{Sept. 28}

In a case of Billroth's²_{Mar. 2} the result was doubtful. In one reported by Salzer⁸⁴_{Feb. 2} the operation was too recent to allow of any conclusion as to its effect, and in one by Larger¹⁴_{Oct. 16} there had been a recurrence of seizures four months after the operation, which it was proposed should be repeated.

MISCELLANEOUS.

The diagnostic value of aural hæmorrhage in cases of head injury is discussed by Bennett,⁹_{Dec. 22, '88} with the following conclusions:

that it is in itself no evidence of fracture of the base of the skull; that even with other symptoms it only adds to the presumption of such lesion; that the membrana tympani should always be examined, and if this is unbroken the bleeding is not due to fracture of the base; that all the signs of fractured base may be present with mere concussion; and that many of the cases recorded as recoveries after fracture of the base were, in reality, instances of concussion only.

An interesting specimen of hyperostosis cranii, beginning probably in inflammation in the ear, was shown to the American Neurological Association by Putnam.⁹_{July 5} Another, in which the overgrowth was limited to the right side of the median plane, was shown by J. Hutchinson²_{Jan. 26} to the Neurological Society of London.

A very singular case of multiple subperiosteal sarcoma of the skull, relieved by operation, is reported by Matas.¹²_{June} The patient, a negro aged 35 years, had received a blow on the head seven years previously. It is not stated whether or not there was suspicion of syphilis. As the man left the hospital only ten days after the operation, the result of the case must be regarded as doubtful.

In a case reported by Maudsley²⁸⁵_{Mar.} a young man aged 16 years died after a fortnight's illness, and at the autopsy it was found that the whole of the periosteum and the dura mater was stripped off the temporal bone, pus occupying the interval. The bone was dead. There was softening clot filling the lateral sinus and a commencing abscess in the temporo-sphenoidal lobe. The lungs were full of embolic abscesses. The condition was one of acute necrosis of the temporal bone,—a condition similar to the acute necrosis of a long bone.

Hennessy²_{June 5} reports the case of three men struck at the same time by lightning. One was dead. At the autopsy no mark of any kind was observed; rigor mortis was pronounced; the blood was very fluid and bright red in color, and the left ventricle of the heart was very rigid. The other two suffered somewhat from shock; one had a superficial burn on the inner side of the left foot, and the boot was torn on that side from heel to toe. The third man had only a small mark on the dorsum of the left foot, and at the inner side of the boot there were two small holes, the edges of which were everted, as if a knitting-needle had been thrust through

from within. The second man had headache for a day or two, and pain in the back for a fortnight.

Perier³_{Apr 1} showed before the Académie de Médecine a male child upon whom he had operated for meningo-encephalocele. The child had been born at term, and bore in the occipital region, exactly in the middle line, a tumor which rapidly increased in size from the time of birth, until at the age of 3 weeks it had attained the size of a large orange. The tumor was fluctuating and irreducible, non-pulsatile, even when the child cried. It was evacuated by aspiration of its contents, consisting of cerebro-spinal fluid. The pedicle was then ligated in two portions and the mass cut off. A salol dressing was applied and not removed for eight days, at the end of which time union was perfect. The tumor was found to be, as diagnosed prior to operation, a meningo-encephalocele.

Ayres¹⁶¹_{Mar} reports a case of paracentesis for internal hydrocephalus. The patient was a 5-year-old boy. At the age of 3 months he began to have convulsions during sleep. They continued until the age of 1 year. After they had continued for three months the head began to increase in size, and he became both imbecile and blind. He never walked or stood, but there was no paralysis. He had no control over the bladder or rectum. He had frequent rotary movement of the head, with slight retraction. On December 14, 1888, a 1-centimetre (0.40 inch) trephine was applied over the position of the coronal suture to the right of the median line. A delicate trocar was then passed through the dura and into the brain downward, backward, and inward to the depth of 2½ inches (63 millimetres). From the canula there slowly dropped about an ounce (59 cubic centimetres) of clear, limpid fluid. The canula was then withdrawn, on its way through the subdural space giving exit to some more fluid of a character similar to that first withdrawn. The wound in the pericranium and skin was sutured. For several days the same limpid fluid escaped (probably 4 to 8 ounces—125 to 250 grammes—in all). No bad symptoms followed, and the child was able to stand alone in two or three days. Sight re-appeared, and in about three weeks he was able to walk. All of his other symptoms lessened, except that he did not learn to speak, and had poor control over the sphincters. In January, 1889, he lost power of walking for a few days, but soon regained it.

Ayres considers it possible that more fluid may have to be withdrawn, as the condition is in some respects not quite so favorable as shortly after the operation.

SURGERY OF THE SPINE.

During the past year much has been learned of the indications for and technique of operations upon the spine for both injury and disease. A review of the history of spinal surgery, with the various arguments advanced for and against the practicability and utility of operations upon the spine, is given by White.^{96 July} He reviews the literature on the subject, and the appended bibliographical list is of value to those investigating the subject. He lays down clearly the class of cases that, in the present state of knowledge, are considered susceptible of relief by operation, and gives directions for the actual performance of the operation. He proceeds as do other operators, but insists strongly upon the value of obliquely-angled bone-forceps alone for removing the spinous processes and laminae. The separate removal of the former is considered by him to add nothing to the gravity of the operation, but, by giving room, greatly facilitates the performance of the later steps. He reiterates, with others, the statements that the damage to the cord in cases of fracture of the vertebræ may be produced by pressure in the early stage by bony displacement, or in the later stages by newly-formed fibrous tissue, and also that in caries the pressure effects, as insisted upon by Gowers, are, as a rule, produced by inflammatory products rather than bony displacement. Robert Abbe,^{59 Feb. 9} reports 2 cases of spinal operation for disease. Case 1 was a male aged 22. About one year before examination he complained of tenderness on pressure and pain on motion in the region of the ninth and tenth dorsal vertebræ. To the right of the spines of these vertebræ there was slight superficial fullness. He had been treated with potassium iodide, quinine, blisters, etc., during the time intervening between the time of onset and the date of the complete examination. There was no history pointing toward syphilis or tuberculosis. Soon after the symptoms above noted had appeared there was gradual development of paraplegia, with loss of tactile sensibility in the lower extremities, while a line of hyperæsthesia developed around the abdomen. Besides the

paraplegia there were twitchings in the legs and vasomotor disturbances. The spine became rigid and very painful. Hectic supervened, with marked girdle-pain and incontinence of urine and faeces. On inserting an exploring-needle a drop of pus was obtained. It was deemed best to operate, in order, if possible, to remove the compressing body. Accordingly, the spine was exposed, and the laminae of the eighth, ninth, and tenth dorsal vertebrae, which were bare of periosteum, removed. The entire spinal canal at the seat of operation was found full of desiccated pus and connective tissue, compressing the cord against the anterior wall. The diseased tissue was scraped away and the wound closed. Over the dressing there was applied a plaster-of-Paris jacket. On the eighth day sensation began to re-appear. In the fourth week motion returned, to a slight extent, in the parts previously paralyzed, while fever and pain disappeared. In six weeks he moved both legs well, and in ten weeks was able to sit in a rolling-chair. In the third month he walked with crutches, and at the end of eight months walked unaided, and was, apparently, perfectly well.

Case 2, male, aged 44, had severe pain in right forearm, supposed at first to be a neuralgia of the brachial plexus. Numerous methods of relief were tried, but without avail. There was atrophy of the muscles of the interosseous spaces, and the hand was stiff with semiflexed fingers. The posterior interosseous and ulnar nerves were stretched without affording relief, and, finally, amputation of the arm was performed just below the deltoid attachment. Even this measure failed to relieve the pain, which was only moderated by $\frac{1}{2}$ grain (32 milligrammes) of morphine every hour. The patient was etherized, and the laminae on the right, from the third cervical to the first dorsal vertebra, were removed by means of a rongeur. The dura appeared rather full, but no tumor was found, and the intervertebral foramina appeared healthy. The sixth and seventh nerves were hooked up, drawn into reach, and severed just outside of the dura. The wound was packed with iodoform gauze and left open. The pain remaining severe, the patient, forty-eight hours later, was placed in the prone position, and, without anaesthetic, the packing was removed and the dura slit up to the extent of $1\frac{1}{2}$ inches (37 millimetres). The cord and the membranes looked sound. The eighth nerve was cut across close to the spinal column. On handling this nerve, pain similar to that before ex-

perienced was caused. The posterior columns were very sensitive. The dura was sutured with fine catgut, and the superficial wound closed. Healing occurred by second intention. The pain was much moderated, so much that the morphine was entirely withdrawn by the eleventh day. At the end of the third week he walked freely and the pain was much relieved. Among other observations the author gives many facts of great importance, both physiologically and in the matter of diagnosis, in nerve-trunk localization.

The following case is recorded by Lloyd and Deaver²⁴².
Female, aged 44 years, German. No history pointing to syphilis, tubercle, or alcoholic excess. Four months before admission the patient began to have burning pain in the head, followed by gradual loss of power in the left leg and later in the left arm. There was no affection of face or tongue. Slight swelling to left of third cervical spine was noticed. The neck became stiff and left arm began to jerk during sleep. At the time of admission her left arm was paretic and slightly wasted; the left leg was paralyzed and slightly spastic, with ankle- and rectus-clonus. The knee-reflex was exaggerated on both sides. Electrical reactions were normal. The right arm and leg were normal, except for a slight ankle-clonus. There was no anæsthesia or paræsthesia. Motion and sensation above the shoulders were normal. There were no changes in the eye-grounds. Operation was decided upon and was performed by Deaver. A longitudinal incision was made over the median line of the nape of the neck, extending a little above, below, and down to the affected vertebræ; then he separated the muscular attachments and reflected the soft parts laterally on either side as far as the junction of the transverse processes with the pedicles of vertebræ, thus clearing the spinous processes, as well as the laminae of the third and fourth cervical vertebræ and their ligamentous attachments, when was exposed a bony tumor, convex from above downward and from side to side, being much larger upon the left side. The soft parts were normal. The spinous processes were removed at their bases with bone-pliers, the laminae on each side, and divided by the same instrument behind the articular processes. The spinous processes were a little softened, the laminae, especially on the left side, soft and large, with some pus in the cancellous tissue. The dura was adherent to the laminae, was intact, a little

opaque and thickened, but otherwise normal. An exploring-needle was inserted beneath the dura with negative result. A rubber drain was inserted, the muscles and deep fascia united by catgut, the superficial tissues with wire, and a sublimate dressing applied.

After the operation the respiratory rhythm underwent a peculiar alteration in that inspirations were deep and gasping, with long intervals between the acts. There was no improvement in the palsy. Death occurred from failure of respiration, due (according to Deaver's idea) to injury by the exploring-needle. At the *autopsy* the intra-cranial contents were found to be normal. There was found a tumor of the cervical cord involving the left anterior horn, antero-lateral column, part of the column of Burdach and posterior root-zone, with ascending degeneration in the posterior columns and cerebellar tract on both sides, and an area of hæmorrhagic extravasation.

In closing the surgical portion of the paper, Deaver expresses his conviction that the proper course to pursue in such cases is to lay open the dura mater instead of using the exploring-needle.

Herbert W. Allingham, ^{June 1}₆ reports 2 cases of fracture of the dorsal vertebræ upon whom he operated. The first case was a man, aged 31, who received his injury by falling 30 or 40 feet (9 or 12 metres). He had the usual symptoms of spinal compression. Owing to the appearances of evidences of secondary degenerations, he was operated upon three months after the receipt of his injury. By a 12-inch (31 centimetres) incision the spinous processes and laminae were exposed, showing a fracture of the sixth dorsal vertebra; some loose fragments were removed. Healing took place kindly and early, but no marked improvement resulted. The second case was a woman, aged 21, who fell 40 feet (12 metres), receiving a fracture of the fourth and fifth dorsal vertebræ. Five days after admission an operation was performed, and the laminae of the fourth dorsal vertebra found to be fractured. The laminae of the third, fourth, and fifth dorsal vertebræ were removed, the cord being found crushed, and a spicule of bone projecting from the body of the fourth vertebra. Pulsation in the cord was absent below that point, but on removal of the spicule it returned. The dura was opened, but no clots were found. The wound healed well, but no relief was afforded, the patient dying seven months later from bed-sores, cystitis, etc.

Dercum and White⁹⁶ report 2 extremely interesting cases of spinal disease upon whom operations were performed. Case 1 was a man aged 55. His father died of carcinoma of the stomach, his mother of phthisis. There was no history of injury or of venereal trouble. In December, 1887, he was attacked by severe burning and shooting pains in the inner side of the arms, intensified by motion. There was no paresis. Three or four days later there was distinct weakness in the thighs. This weakness spread downward to the feet and upward to the breast, and in eight days he was completely paralyzed. Both anal and vesical sphincters were involved. Numbness was marked up to level of the nipples. He had no pain in the leg or anæsthesia in the arms. Three weeks after the onset pain in the arms had disappeared. It was at about that time that he noticed girdle-pain at the level of the nipples, while soon after a small sacral bed-sore formed. His general health became impaired, and he was admitted to the hospital on October 1, 1888. On admission there was found complete paraplegia from the toes up to the fourth or fifth intercostal space. All of the reflexes, both superficial and deep, were increased. There was no spasticity or wasting. Faradic irritability was slightly increased. Anæsthesia to touch and temperature was present over the paralyzed area. The anæsthetic area was sharply limited above, at the level of the second rib. Just below this line was an intense girdle-pain. Percussion on the vertex intensified the pain, as did also percussion over the third, fourth, and fifth dorsal vertebræ, and flexion or torsion of the trunk. There was no anæsthesia or paresis of the arms. The left pupil was slightly larger than the right. On October 17th an incision was made from a little above the spine of the vertebræ prominens to below the level of the sixth dorsal spine. The vertebræ were exposed, and the spinous processes of the fourth and fifth divided at their bases. The laminae of the fourth and fifth vertebræ were removed, as, later, were those of the first, second, third, and fourth. Nothing being then found, the dura was incised and found adherent by fibrous tissue to the pia mater. The cord itself appeared to be normal. The dura was stitched with interrupted catgut sutures, a rubber drain inserted, the deeper tissues united by catgut, and the skin with silver wire. The deep parts of the wound healed rapidly, and by six weeks perfect union was

obtained. The operation lasted an hour and a half. Five hours later he complained of great pain in the knees, which was relieved by flexing the limbs. The girdle-pain had already, by that time, disappeared. On the day after operation sensation had returned in the feet, but he located the point of contact too high, and referred it to the untouched foot. Two days after the operation the thighs were involuntarily strongly adducted. The location of sensation was still imperfect, except in the neighborhood of the right knee. The rapidity of appreciation of touch was delayed in some places. The reflexes remained as before operation. Five days after operation there was possibly movement in the right toe, becoming positive by the seventh day. At about this time the previously exaggerated reflexes upon the left side diminished. By November 1st the bed-sore had healed. In December he had regained great power in the legs and thighs, while sensation had become more nearly normal. At the time of the report he had regained some power over the sphincters, while motion had much improved, and he could sit up in a chair for three or four hours together. At the same time no pain was caused by percussion on the vertex, and there had been no return of the girdle-pain.

Case 2 was a male aged 23. There was no history of injury or syphilis. Sixteen months before coming under observation he began to have pain across the small of the back of a dull, aching character, seeming to encircle the body, but more intense on the left side. He gradually became unable to walk as before, and noticed clonus and stiffness on certain movements. In March, 1888, he was admitted to the medical wards of the hospital suffering from pneumonia. Convalescence was prolonged, and during its progress marked tremor of the extremities was noted. Walking became impossible two weeks after being allowed to rise from bed. Finally, he became unable to move the legs at all. On re-examination it was found that all of the muscles of the lower extremities were paralyzed completely, the superficial and deep reflexes being much exaggerated in them, with disturbance but not loss of sensation. There was no sphincter paralysis. There was slight prominence over the tenth and eleventh dorsal vertebræ. Tubercular disease was suspected and operation advised. On December 12, 1888, the spines and laminae of the ninth, tenth, and eleventh dorsal vertebræ were removed. Patient died thirty hours after operation.

At the autopsy there were found tubercles in both lungs and amyloid disease of the kidneys, with tuberculosis of the dorsal and lumbar vertebræ, and red softening of the spinal cord at the level of the eleventh dorsal vertebra.

A case of spinal operation for traumatism, with a successful issue, is reported by Robert Dawbarn.¹_{June 29} A man, aged 29, fell from a height of 12 or 15 feet (3.6 or 4.5 metres), striking on his back, in August, 1888. There was immediate paralysis of both motion and sensation below the level of the ribs. He was treated with supporting apparatus for four months, at the end of which time there was still complete paraplegia with involuntary defecation and retention of urine. There was a prominence in the region of the twelfth dorsal vertebra. A bed-sore existed over the sacrum and there was cystitis. Galvanism was applied with steady but slow increase of galvanic irritability, but with no motor improvement save only that the patient gained some power in the sartorius muscle of both sides. No further improvement occurring on February 27, 1889, ether was administered, and an incision made which runs like a capital **H** down the back, with a vertical stroke on either side the spine, and a transverse stroke placed opposite to, above, or below the middle of the vertical, as may seem best. The vertical strokes are directed, as they are deepened, obliquely inward toward the median line of the body, and strike the bones about the middle of the laminae. This obliquity permits sawing the laminae with Hey's saw with much less retraction of the muscles and consequent laceration than otherwise. The muscles are separated a sufficient distance at the bone-level to permit of sawing without laceration. Retractors with an especially deep and flat traction surface are of course indispensable.

In sawing, one must direct the saw quite sharply inward. If the saw-cut is made at all parallel with the long axis of the spines, the canal will probably not be opened, but the teeth will advance into the body of the bone. This necessary obliquity of the saw-cut, too, prevents the re-implanted bone from sinking too far inward toward the cord, even under pressure. The saw-teeth should cut the narrowest possible groove. The laminae being severed over a sufficient number of vertebræ, with due care not to wound the theca, the next step is to make the transverse cut of the **H** between two of the spinous processes. This stroke is deepened

obliquely upward, and of course cuts the supra-spinous and inter-spinous ligaments.

Assuming that the transverse stroke is made low down in the **H**, there is now a long superior flap of spinous processes and their laminae covered with their undisturbed muscular and cutaneous investments. Their vascular supply being so little interrupted, these bones are almost sure to live. The flap is now reflected, not *directly* upward nor (if the lower flap) *directly* downward,—for the spinous processes, coming mutually in contact, will quickly prevent this.—but *obliquely* upward, outward, and backward; or downward, outward, and backward, as the case may be. And in this way a perfectly free view of the theca and canal is easily obtained.

The patient lying in the left latero-prone position, the **H**-incision was made. The vertical arms ran 8 inches (20 centimetres) in length from the seventh dorsal to the second lumbar vertebra, slightly diverging as they descended. The transverse arm ran between the kyphotic spinous process of the twelfth dorsal and the first lumbar spine, which point was about 2 inches (5 centimetres) above the lower ends of the first incisions.

The operation being begun in the manner described above, the eleventh dorsal vertebra was found to be very adherent to the membranes. On exposing the cord, it was found to be tightly compressed from both before and behind. A transverse healed rupture of the dura was found just below the eleventh dorsal lamina. Owing to the poor condition of the patient nothing further could be undertaken, and the wound was closed. The incisions healed well. Ten weeks after the operation motion was still lost save in the sartorii, where power was somewhat greater after the operation than it had been before. On the other hand, he had control over the bladder and an increased control over the rectum, and there was no pain on movement. The quantitative electrical conditions of the paralyzed muscles were much better, while faradic stimulation produced much better contraction than before the operation. The temperature of the legs and feet was much less depressed than before, while the toe-nails were growing more vigorously. The reporter urges the necessity for early operation in traumatic cases, *i.e.*, after the primary shock has subsided.

J. E. Richardson¹⁵⁷_{July} read before the Brooklyn Surgical Society

the account of a case of caries of the fourth and fifth cervical vertebræ, upon whom operation was performed, resulting in death on the fourth day.

Bullard and Burrell, ⁹⁹_{Oct. 24} in a paper read before the American Orthopædic Society upon the operative relief of pressure-palsy in spinal caries, report the case of a male, aged 46, suffering from that condition, upon whom spinal resection was performed, the patient dying thirty-six hours after operation. The only marked peculiarity in the method of operating employed was the attempt to use a surgical engine for dividing the laminae. The saw broke while in use, and the separation was completed with an osteotome. The laminae and spines were raised *en bloc*, and on completion of the inspection of the cord, which was found to be flattened and not pulsating at the level of the fifth dorsal vertebra, these parts were replaced and held in position by suturing to the adjacent muscular masses. The cause of death was shock.

The authors record 12 operations (including their own), and the summary of their views as to the propriety of operating are as follow: Contra-indications—1. Those cases in which an operation would not be advisable, from the general health or other general surgical considerations. 2. The presence of tuberculosis in other parts of the body. 3. The presence of an abscess with the caries which can be otherwise evacuated. 4. Acute exacerbations without symptoms referable to the cord and not threatening life. The indications in favor of an operation were: 1. General good conditions and favorable surroundings (*a*) when the disease is gradually and slowly progressing to an unfavorable termination, and (*b*) when the patient has more or less loss of motion and sensation in the portions of the body below the level of the lesion and incontinence of urine and faeces, and when these conditions have lasted for a sufficient length of time to render spontaneous recovery improbable, and not so long as to produce permanent destruction of all recuperative power in the cord. 2. When acute symptoms threatening life appear, and when there is reasonable expectation that they may be relieved by the removal of the compression.

Bayer ⁸⁴_{Apr. 6} reports a successful operation upon a spinal meningocele. The patient, a male aged 10 years, when first seen, was in a very low condition, and suffering from diarrhœa and eczema of

a portion $\frac{1}{6}$ inch (4 millimetres) long removed. She had a severe attack of pain just afterward, which soon subsided and had not recurred after seven months. Ullmann⁸_{Mar. 7} has performed neurectomy of the third branch of the trigeminus at the foramen ovale, temporarily resecting the zygoma for the purpose. This new device is said to facilitate the operation. Thiersch¹¹³_{June 9} has invented a special forceps for drawing out nerves in cases of neuralgia. The instrument consists of two smoothly-serrated blades, one convex, fitting into the other, which is concave. When the infra-orbital nerve is to be operated upon, for instance, an incision is made over its point of emergence, the trunk is freely exposed, and then carefully and firmly grasped with the forceps. The nerve-trunk is then very slowly twisted around the grasping blades until the central end is torn. This always gives way before the peripheral end. The latter may be cut off close to the forceps or pulled out if it is desired best to avoid all possibility of nerve regeneration along the old tract. He has operated twenty-eight times on 17 patients. In 5 cases the supra-orbital was involved, in 11 the infra-orbital, in 3 the lingual, in 4 the infra-maxillary, in 1 each the mental, auricularis major, intercostalis, etc.

Von Mangoldt¹²³_{Feb. 1} reports several cases of nerve-extraction according to the method of Thiersch. Only one was of sufficient date to be quoted. A woman, aged 41 years, had tried everything possible for the relief of an excruciating right infra-orbital neuralgia, but without benefit. An incision was made; the infra-orbital canal was exposed and partly opened by breaking off small pieces of the roof of the canal at a time, after which the nerve was caught up with a tenaculum and grasped with Thiersch's forceps. The nerve was then very slowly twisted, at the rate of one turn every two seconds. The severing of the central part could be distinctly heard, and the lips and ala of the nose were pulled by the traction on the peripheral portion of the nerve. In this way the entire trunk and branches of the nerve were extracted. Even the dental branches were pulled out of their bony canals. The patient was discharged cured in eight days, after suffering for thirteen years. Three months after operation there is only some paræsthesia around the scar. A general facial paralysis followed the operation on the same side and lasted over three weeks, though nothing of it was left at the end of four weeks. It could not be

accounted for on the ground that motor fibres had been involved in the incision, but must have been of a reflex nature.

A remarkable case is reported by Bennett.⁶_{Apr.27} A man, 45 years old, had acute pain, sometimes spasmodic, in the left leg, the tibia of which was affected with syphilitic thickening. Medical treatment was exhausted in vain. The bone was trephined; amputation through the knee was done; the sciatic nerve was stretched, and $2\frac{1}{2}$ inches (63 millimetres) of it removed. Pain, referred to the amputated leg, still persisted, and it was determined to lay open the spinal column to search for any possible lesion there. This was done, and the posterior roots of the first, third, fourth, and fifth lumbar and first and second sacral nerves were divided. So far as pain was concerned, this operation was a success; but on the twelfth day there was sudden collapse, cerebral hæmorrhage, and death in a few hours. The discussion on the report of this case at the Royal Medical and Chirurgical Society gave evidence of its very unusual if not unique character.

A case of ascending neuritis with intense neuralgia, in a girl of 14, blind since two weeks after birth, and possibly with inherited syphilis, is reported by Stewart.⁴⁴_{Mar.} The right leg was first affected, and relief was finally obtained by exsection of $\frac{3}{4}$ inch (19 millimetres) of the sciatic nerve; but muscular atrophy and paralysis ensued. The left ulnar nerve next gave trouble, and was divided with success. A most extraordinary procedure is reported by Leprévost.³¹_{Oct.16} This surgeon, after a series of anti-neurotic remedies had proved of no use in a case of neuralgia of the intercostal nerves, in a young girl of chloro-anæmic temperament, decided upon operation. The patient had suffered for four years with a very severe neuralgia, which persisted over the left side in the region of the seventh and eighth intercostal nerves. Leprévost resected the cartilaginous edges of the thorax at the level of the most severe pains. This was on the anterior extremity of the seventh and eighth intercostal nerves, which were exsected for about 6 or 7 centimetres ($2\frac{2}{5}$ to $2\frac{1}{5}$ inches). The wound healed without incident, and the pains were abated until the girl was able to rest and sleep quietly, and fifteen days after the operation she left the hospital. Six weeks later she had continued to improve. Powers¹_{Mar.23} gives the case of a man in whom he sutured the median nerve and the superficial flexor tendons, divided by a

wound two years previously. Union took place. Six days after the operation there had been, in the parts supplied by the nerve, great pain, but this had slowly subsided. After three months sensation had returned in the hand, but not motion. This was the usual result, and hence immediate suture should always be performed. Early passive movements were important in order to obviate adhesion of tendons.

A more fortunate result is reported by McFarlane⁵⁹ Jan. 12 in the case of a man, aged 20, who, in January, 1885, received a blow with an axe, dividing the tendo Achillis and the posterior tibial artery and nerve. He was in bed for sixteen weeks without extension of the foot, causing a lengthening of the tendon by about 1 inch (2.5 centimetres). The muscles above and below the injury were atrophied and flabby in May, 1888. Ever since the accident the foot has been useless as regards both motion and sensation (plantar). On June 4, 1889, the old cicatrix was incised over the nerve, when the divided ends were found imbedded in the scar, with the ends at least $\frac{1}{2}$ inch (13 millimetres) apart. Both ends were bulbous for a considerable distance. They were freshened and sutured with fine silk. The upper segment had to be pulled down and the foot firmly extended to bring the ends together. The wound was closed with silk sutures and dry antiseptic dressings. Return of very distinct sensation on the second day. On the twenty-ninth day he had fair amount of movement in the ankle, but could not move the toes. On September 7th he was able to walk without aid or difficulty. According to Richardson,⁹⁹ Apr. 18 in the suturing of nerves and tendons, catgut is superior to silk because there is less danger of neuritis and subsequent suppuration. Before suturing, the ends should be cut off even and allowed to fall to the bottom of the wound, where they will assume their natural position. The stitching must be done through the retracted neurilemma, and care taken that none of the nerve-ends project. To guard against the main difficulty of fastening the cut ends of tendons so that the stitches will not tear out, it is well to use fine silk in very numerous stitches, placed so closely together around the entire circumference of the tendon as to resist successfully the constant traction of the muscle. In the case of a woman who had cut one of the finger-tendons in the palm, primary union was obtained with the most perfect result. Etzold¹⁰¹ Oct. says that

experiments on animals have shown that nerves do not heal either by primary or secondary intention, and that divided nerves are regenerated by proliferation of the central end. Clinical observations have also shown that the proximal portion of a divided nerve is regenerated more completely, and at an earlier period, than the distal extremity. The return of sensibility is of no service in estimating the degree of nerve regeneration. The symptoms which permit us to assume that nerve regeneration has taken place are (1) active muscular contractions; (2) the disappearance of atrophy, especially muscular atrophy; (3) the late appearance of improvement; (4) the faradic irritability of previously paralyzed muscle. The galvanic current has only slight value in the diagnosis of nerve regeneration. Spontaneous healing of divided nerves is very uncommon. The prognosis in injuries of the nerves is unfavorable when the injury is high up, even if nerve-suture is resorted to. The formation of an extensive connective-tissue cicatrix prevents regeneration of the nerves. It is the duty of the surgeon to resort to nerve-suture in every case of accidental division of the nerves. In the performance of this operation, the avoidance of all irritation, the most stringent antiseptics, and perfect hæmostasis are the main conditions which secure success. If symptoms of stasis follow the injury to the nerve, elevation of the parts and the employment of massage after healing of the wound are indicated. When the wound has healed, direct galvanization of the scar and massage should be employed. It has not been decided whether the application of electricity to the parts supplied by the injured nerves limits the extent of degeneration and hastens regeneration.

Peripheral paralyses are to be treated by massage and passive movements. The use of the limb after the injury appears to promote recovery.

An extremely interesting report of a case of *nerve-grafting* is given by Robson.^{2 Feb. 2} The patient, a girl 14 years old, had a tumor the size of a hen's egg on her right wrist, extending up 3 inches (76 millimetres) from the annular ligament and involving the median nerve. The tumor was removed at the same time that Ward amputated a thigh, and 2½ inches (63 millimetres) of the posterior tibial nerve of the severed member was grafted into the space left by the removal of 2¼ inches (57 millimetres) of the median with the tumor. The piece to be grafted was carried from

one room to the other in a warm carbolic solution. The suturing was done with fine catgut, and without leaving any tension. Healing was by primary union. The grafting was done forty-eight hours after the tumor had been removed, and thirty-six hours after the nerve had been grafted sensation had so far returned in the parts supplied by the median that the touch of a pencil could be localized. In five weeks sensation was fully restored, though there still remained paresis of the abductor and flexor brevis pollicis. The interesting feature was the rapid recovery of function after grafting. The conditions to be observed in such operations were (1) entire absence of tension in the grafted nerve, *e.g.*, $2\frac{1}{2}$ inches (63 millimetres) being employed to fill an interval of $2\frac{1}{4}$ inches (57 millimetres); (2) great care in dissecting out and handling the nerve; (3) immediate transference of the living tissue to its new bed; (4) the employment of only a single suture to fix the ends of the nerves; and (5) strict asepsis. This case disproves the theory that a primary union of the divided ends of a nerve is only an appearance of union and not a physiological one, and that the distal ends must pass through a process of degeneration before regeneration. The return of motor function was slower than of sensation, as is usual. Puzey¹⁸⁷_{July} reports a case of pressure by the callus of a fractured humerus upon the musculo-spiral nerve, causing complete wrist-drop and loss of power in the extensors of the hand and fingers. The fracture had occurred three months previously. A 4-inch (10 centimetres) incision was made over the course of the nerve, which was found firmly imbedded in and squeezed by the callus. The nerve bulged out when the neurilemma was incised; it was plump, pink, and fleshy-looking. It was dissected out of the groove, the wound closed and drained, and a Lister dressing applied. Instead of an Esmarch tube, a solid-rubber tube had been employed by mistake of an assistant, with the result of causing marked paralysis of all the nerves of the arm for several days. With the daily use of galvanism, massage, and mustard-baths, after a week a slight tingling appeared in the parts supplied by the musculo-spiral nerve. In a few months recovery was complete.

Princeteau¹⁸⁸_{Jan. 6} records an interesting case of trophic changes occurring in consequence of interstitial neuritis following a fracture of the leg in its lower third. At the time of the accident the patient was 54 years old, and amputation of the thigh was done

with good result fourteen years later. All the tissues of the limb were in a state of degeneration histologically.

Richardson⁹⁹_{July 4} reports that in the Massachusetts General Hospital there have been 7 cases of nerve-suture; these pertained to the median, ulnar, and musculo-spiral nerves, and the operations were followed by marked though very gradual return of power and function. The nerve-ends must be freshened, brought loosely together, and a few fine catgut or silk sutures put in.

It would appear from the report of a commission²⁷⁶_{Mar. 29} that the subject of nerve-suture, primary and secondary, has been exhaustively discussed by an author whose name is not given, but whose essay will be published under the sanction of the Société Royale des Sciences Médicales et Naturelles de Bruxelles. Its motto was: "The surgeon who neglects to suture a divided nerve commits almost the same fault as if he failed to reduce a fracture or to bring together the ends of a severed tendon."

THORACIC SURGERY.

By J. McFADDEN GASTON, M.D.,

ATLANTA.

General Considerations.—Traumatic injuries, with the various changes of structure, subject to macroscopic observations of the thorax, which call for surgical interference, come under consideration in this review of progress in thoracic surgery.

Everything pertaining to the gross derangements of the walls of the chest, with the modification of tissues entering into its contents, including the exudations from its serous membranes, demands attention. But it is only admissible in this undertaking to treat of the more important disorders of this region which have passed under the observation of the profession in these latter years.

It is my expectation to present a general outline of what has been accomplished, with typical cases illustrating the different thoracic disorders and the measures of treatment which have been adopted, without entering into minute details.

In the descriptions I have adopted the language of authors generally, without using quotation marks, but in many instances the phraseology has been modified for the sake of brevity in the reports. No responsibility is assumed for the views of authors presented without comment, and this is intended to be a history of the existing state of thoracic surgery throughout the world.

EXTERNAL INJURIES OF THE THORAX.

It has been a mooted point as to the development of pneumonia by concussion from violence to the thoracic walls. But there is no longer a doubt that the shock from blows upon the parietes of the chest may be extended to the contained viscera so as to produce notable effects.

The consequences may be limited to congestion, with capillary engorgement, or result in inflammation, which is likely to terminate in effusion or in purulent collections in the serous cavities. The

measures of relief in the slighter injuries may be entirely medical, but in the graver cases surgical interference is requisite. The traumatism may be local, and yet transmitted by inflammatory process to the pleura, heart, or lungs.

Accidents implicating the thoracic walls, consisting of the intercostal spaces, the ribs, and the sternum, are accompanied by contusions or lacerations of the soft parts and fractures of the bony structure. When the injury is limited to the parietes, though extensive, the case is comparatively simple. In fractures of the ribs or sternum, without displacement of the fragments, there are not usually any serious consequences; but if the violence is such as to thrust the ends of the ribs or the edges of the sternum inward so as to irritate the pleura, we may have pleurisy or traumatic pneumonia. Should the displacement be attended with laceration of the pleura, even without an external wound, more serious trouble may ensue.

With a view to obviate the friction resulting from the respiratory act, a bandage around the body or adhesive plaster, extending from the spine along the line of the ribs involved to the sternum, is found advantageous. The breaking up of the cartilaginous attachment of the ribs to the sternum causes some deformity, which may be corrected by a firm compress so as to favor the better apposition of the parts. In case of fracture of the sternum transversely, the separation occurs most frequently at the junction of the upper and second portion, being of the nature of a dislocation, but there is rarely such displacement as to require special means of confinement for the bones.

If the violence causing such fracture has been sufficient to drive the fragments inward so as to penetrate the lungs, emphysema will be an early indication of this lesion; but this result may follow an accident extending only to the pleural cavity by insufflation of the air from without. Hæmorrhage in the pleural cavity may occur from laceration of the internal mammary and intercostal arteries by a foreign body, or by the fragments of the ribs, and the collection of blood may oppress the lung so as to seriously interfere with its function. If the dullness upon percussion, along with positive evidence of arrest in the act of respiration on the side implicated, satisfies the surgeon of a large accumulation of blood in the pleural cavity, it should be evacuated by a large trocar or a free

incision, and search made for the bleeding internal mammary or intercostal artery. Should the pulmonary tissue be wounded, there will almost certainly be bloody expectoration, and, although this may occur occasionally from a blow over the chest without penetration, it may, for the most part, be determined by the nature of the accident whether the hæmoptysis results from a wound of the lung-tissue or from shock. Injuries to the pulmonary structure can only be treated by rest and sedatives; but, fortunately, the restorative power of adhesive inflammation in the lung-tissue is found to be available for the relief of these injuries.

Gunshot wounds of the chest involving the lungs, and penetrating wounds with daggers or other sharp and narrow implements, which pass through the intercostal spaces into the cavity, are the most serious traumatic injuries of the lungs with which the surgeon has to deal. There is always considerable difficulty in making a correct diagnosis, but if the blood is driven from the external wound mixed with air so as make a pink froth it may be inferred that the lung itself has been penetrated by the foreign body. I saw a case with a colleague, in this city, two years ago, which serves to illustrate this point in a gunshot wound of the thorax. We were in doubt from the course of the pistol-ball whether the lung was entered or not, but, in turning the patient over for a thorough examination, the bloody froth from the most dependent opening, under the act of expiration, satisfied us of the nature of the injury.

HÆMORRHAGE IN THE CHEST.

The immediate cause of apprehension in penetrating wounds of the lungs, either from balls or from perforating weapons of any kind, is hæmorrhage, with exhaustion or consequent asphyxia, from the pressure upon the lungs. Secondarily, there is also danger from inflammation, set up by the effects of the injury or, in some instances, by pieces of clothing being carried along with the foreign body causing the wound.

It is held that the collapse following this class of injuries, if not threatening life, may be useful by checking the flow of blood. The practice of blood-letting recommended by English authors, "even to syncope from a large opening in the vein," is not likely to be adopted in this country. We are content to reduce the force of the circulation by tartar emetic and veratrum, with the

addition of ergot and opiates, when required to secure composure of the patient. It is not desirable to close the external wound under such conditions as are presented in the accumulation of blood in the cavity of the chest; but, on the contrary, the patient should be so inclined as to force the escape of blood from the opening, and if there is a large accumulation in the chest, so as to cause much dyspnoea, it must be removed by an operation. A moderate collection should not be interfered with, as it will be absorbed in the course of time, but if great it should be evacuated to avoid the immediate and remote evil effects. Such an accumulation embodies all the features of a hæmatoma, and must eventually become disintegrated and degenerate into a decomposing mass of grumous blood or become purulent. I have had an opportunity of verifying by a post-mortem this process of disorganization in a case of gunshot wound of the thorax, which might doubtless have been averted by a timely paracentesis thoracis.

INJURIES TO THE HEART.

Injuries of a traumatic nature may be inflicted upon the heart or the pericardium, within certain limits, without serious results; and there are well-authenticated cases in which wounds of the muscular walls of the heart have healed. But if the cavity of either ventricle is penetrated, the escape of blood into the pericardium and thence into the pleural space, leading to hæmatoma, admits of little relief by absorption or by surgical interference.

An interesting series of experiments has been made by B. A. Watson, of Jersey City, upon dogs, by puncture of the heart in cases of its arrest under the influence of chloroform.

The experimental study of cardiocentesis in cases of chloroform necrosis has enabled him to reach the following conclusions: 1. Puncture of the heart, especially the right ventricle, stimulates muscular contractions, and may be advantageously employed in the treatment of this morbid condition. 2. The best results are obtained when abstraction of blood from the cavity of the ventricle is combined with the stimulating effects produced by the entrance of the aspirator needle. 3. Puncture of the right ventricle is a safer and more efficient procedure than puncture of the right auricle.

The author succeeded, a number of times, in exciting the heart's action even three minutes after it had ceased. There were

6 resuscitated out of the last 20 animals, and when they recovered from the puncture they continued to live.

A needle taken from the breast of a child of 8 months was shown by Wyman⁹⁹_{Nov.14} before the Boston Society for Medical Improvement, October 14, 1889. Midway between the nipple on the right and the central line of the sternum he found a pulsating area a little smaller than a quarter of a dollar, the skin of which was red, and in the centre of it there seemed to be a foreign body which felt like the head of a pin, pulsating with each pulsation of the heart. Cutting down upon the prominent point, the needle was found and withdrawn. The direction of it seemed to be toward the right ventricle. Since its removal the child is all right. Shattuck thought the foreign body must have been in immediate contact with the heart-valve on the pericardium, if its point was not imbedded in the muscles of the right ventricle.

Peabody showed, at the Association of American Physicians in Washington, a pin which was imbedded in the wall of the left ventricle, and a portion of which projected into the cavity.

Rotch stated that about a year ago he had shown a slate-pencil which, in all probability, had penetrated one of the ventricles, and the child recovered. Dwight's anatomical opinion, on examining the child, was that it must have entered the heart.

FOREIGN BODIES IN THE THORAX.

Foreign bodies in the thorax are accompanied by disturbances deserving of notice. In a discussion before the New York Academy of Medicine, R. C. M. Page⁹_{Mar.2} stated that he had seen a case in which an abscess developed on account of the presence of a bullet, which had entered the lung-tissue twenty years before, the patient having been wounded in one of the battles during the late war. He was thought to have a cavity, and was troubled with cough and hæmorrhages. The case resulted fatally, and at the autopsy an abscess with the bullet in it was found. Reynolds related a similar case in an old Waterloo soldier, where the bullet remained in the lung forty years before the abscess developed.

The presence of a foreign body in the bronchus of a child was verified by E. Mackey²_{Mar.22} in a post-mortem examination. Four months had elapsed after the child swallowed a plum-stone, which caused great dyspnœa, and after death a long section of the plum-

stone was found at the second division of the left bronchus. The tissue of that lung was not much diseased, but the tubes of the other lung were full of purulent secretion, which, it was presumed, floated the stone to the opposite bronchus, and, by blocking the entrance of air to the sound lung, caused sudden death.

Robert Cheesman ⁵⁹_{Mar.16} reports the existence of a nail in the bronchus of a child, 3 years old, for a year, which was expelled, but at the end of three weeks the case terminated fatally. While the child was suffering from a paroxysm of coughing, the father lifted it by the legs, the head dependent, slapping its back between the shoulders rather vigorously several times, with a vague idea of aiding the child in what appeared to be efforts to expel something from the lungs. Upon putting him down the child seemed to be struggling with something in his throat, and the father, inserting his finger, extracted from it a nail which was covered with a thick coating of iron rust and mucus. It measured $1\frac{1}{2}$ inches (3.75 centimetres) in length, with a sharp pencil-point and a circular head, 5 lines (1 centimetre) in diameter. Pus continued to be expectorated in connection with symptoms of septicæmia, which led to the patient's death.

It is stated by Cheesman ⁵⁹_{Mar.16} that Poulet quotes an autopsy by Leunt on a lunatic, in which the trachea contained a nail $1\frac{1}{2}$ inches (3.75 centimetres) long, the head of which was engaged in the left bronchus. The wall of the bronchus, which had been in contact with the head of the nail, was ulcerated and its inner layer destroyed; the nail was covered with mucus and oxidized. In many cases supposed to be of this nature, after the expulsion of the foreign body either spontaneously or by surgical operation, recovery has taken place; but in other cases of this character, where extensive local changes and profound constitutional disturbances have occurred, death has resulted, notwithstanding the removal of the original cause. It is not uncommon for foreign bodies, such as pieces of bone, to remain in the trachea or bronchus for many years, tolerance in the course of time being established, after which very little disturbance was occasioned by their presence.

SEROUS EFFUSION IN THE PLEURAL CAVITY.

Next in importance from a practical stand-point comes serous effusion into the pleura or into the pericardium; and, without look-

ing to the origin of such collections, experience leads us to expect little from medical treatment of these accumulations in the chest.

Fortunately, the aspirator, applied at the upper edge of the fifth or sixth rib on the axillary line, has proved efficient in relieving most cases of serous effusion in the pleural cavity.

In regard to effusions into the pericardium the results of aspiration have not proved in all cases satisfactory, yet the records of success in perforating the sac and drawing off the fluid give us encouragement to resort to this operation in extreme cases of dropsy of the pericardium. The point for introducing the needle depends very much upon the saliency of the sac combined with the position of the heart, and the operator should be well assured of entering the pericardium with the trocar-formed needle without wounding the heart, when the stilette is removed, and the smooth-ended cannula may then follow the incision of the sac, while its contents are discharged, without any risk of injury. When there are no special indications to the contrary, the operation may be performed in the fourth or fifth intercostal space just to the left of the sternum.

This operation has been performed in a few cases for the evacuation of pus, and Bouse, Twist, and Macdonald have reported successful cases of incision into the pericardium, with the use of drainage-tubes subsequently. Surgery has thus, with impunity, invaded the citadel of life.

Anatomico-physiological Aspect.—Alexander James, ³⁶_{Sept.} in a paper on pleurisy and pleuritic effusion, has illustrated this subject from the anatomico-physiological stand-point in a most instructive manner:—

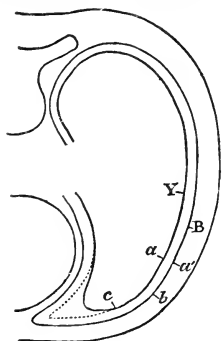
The first point requiring notice is the *locality* or *site* at which the pleuritic process is prone to manifest itself. In the vast majority of so-called idiopathic pleurisy this is in the lower and lateral region. As the patient says, the pain is in his side, and it is here that the characteristic friction sound is to be heard most distinctly and loudly. With a view to explain why pleurisy is specially prevalent at this lower and lateral region of the chest, it is claimed that, as the result of the greatest movement being at this locality, a pleuritic process once originated will here have a special tendency to be rendered more severe.

This can easily be understood from Diagram 1 (page 8), which

represents a section through the chest above the level of the sixth rib. This shows the lung in the position of expiration, the area included by the dotted lines representing its increase in inspiration.

Suppose that at the point *a* on the pulmonary pleura we have a focus of inflammation. During expiration it will be opposite *a'* on the costal pleura and will infect it at that point, but during inspiration it will be moved forward and will infect the costal pleura at *b*, and at the next expiration a portion of pulmonary pleura farther forward will be opposite to *b*. This in turn will be infected, and with the next inspiration the costal pleura opposite *c* will be involved. In time the pulmonary pleura at *c* will become affected, and so with the respiratory movements the inflammatory process will be transmitted forward, *B*, *Y* being, with the respiratory gliding of pulmonary and costal pleuræ, successively affected.

Seeing, then, that this movement spreads the pleuritic process, it follows



DIAG. 1 AND 2.—PLEURISY AND PLEURITIC EFFUSION.
(*Edinburgh Medical Journal.*)

that when it takes place to the greatest extent the pleuritic disorder must be most marked and severe.

When the fluid begins to collect, more and more space is allowed by the progressive collapse of the lung; but this collapse does not take place equally in all directions, and it is most marked in the lower and antero-lateral region, where, as we have just seen, lung-movement is greatest. Thus, in Diagram 2, which represents a lateral aspect of the lung and a front view, the greatest amount of collapse is seen to be from the lateral and lower portion inward and upward toward the lung-root.

Hence, as a lung collapses in the pleural cavity, the space formed by the separation of the pulmonary from the costal and diaphragmatic pleuræ is peculiarly shaped. Looked at on section

from in front (Diagram 3), its base is formed by the diaphragm, its outer border by the costal pleura, its apex by the junction of costal pleura and lung, and its inner, least regularly shaped border by the lung and mediastinum.

Looked at next from the lateral aspect (Diagram 4), the upper limit of this space, formed by the line of junction of pulmonary and costal pleuræ, is arched, the arch being highest laterally and lowest posteriorly. Hence, then, as fluid collects in the pleural cavity, its surface is not a level one like that of fluid in a jar, but a curved one.

This curved line was well demonstrated by Garland, of New York, by injecting warm, fluid cacao-butter into the pleural cavities of animals and of man after death. On opening the pleura after the cacao-butter had cooled and solidified he found its upper surface curved as described.



DIAG. 3 AND 4.—PLEURISY AND PLEURITIC EFFUSION.
(*Edinburgh Medical Journal.*)

The accumulation of fluid and collapse of the lung induce displacement of the mediastinum, with the heart to the opposite side, and displacement of the diaphragm with the liver, stomach, etc., downward.

To illustrate the forces at work in these changes, the author proposes that on the human body, after death, we push a long needle through the fourth left interspace so that its point enters the heart, as is shown in Diagram 5, which represents a section through the body about the level of the fifth rib.

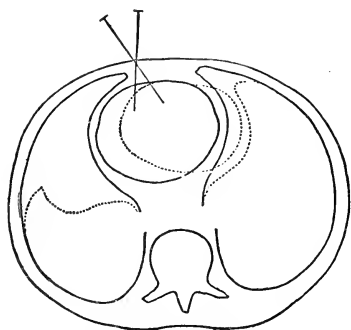
If next we make a free opening into the left pleural cavity, air enters and collapse of the lung occurs; but what is of most importance to notice is that the heart is displaced to the right side, as indicated by a tilting of the head of the needle to the left. Here nothing has pressed the heart over; it has simply been drawn over by the elastic retraction of the right lung. Under ordinary circumstances, the heart and mediastinum are, as it were,

held in position by the two lungs drawing them each to its own side; if this traction is abolished on one side, by letting in air or by fluid collecting, as in pleurisy and hydrothorax, the heart is displaced toward the other.

The point of importance with this is that, whereas displacement of the heart and mediastinum occurs with even small accumulations of fluid, and is therefore a common and an early sign of its presence, displacement of the diaphragm, which can only occur with considerable effusion, is a less common and a later sign of the disease. On the other hand, it is to be remembered that in prolonged cases, where a lung has been bound down and re-

absorption of the fluid is occurring slowly, a traction upward of the diaphragm is specially apt to take place.

As regards the amount of fluid which can be retained in the pleural cavity of an ordinary adult, the author considers 100 to 120 ounces (3100 to 3600 grammes) to be the average capacity. With 60 ounces (1800 grammes) it reaches the third rib, with 40 ounces (1200 grammes) the



DIAG. 5.—PLEURISY AND PLEURITIC EFFUSION.
(*Edinburgh Medical Journal.*)

sixth rib, and with 10 ounces (300 grammes) percussion dullness is only found about the base.

Treatment by Aspiration.—An abstract of 24 cases of serous pleural effusion treated by aspiration was presented by J. B. Bramwell³⁶ to the Perthshire Medical Association.

Three of these cases were not of inflammatory origin, but produced by organic disease of the heart. The author insists that effusions of this nature should be removed as speedily as possible, as their presence greatly aggravates the patient's sufferings by respiratory embarrassment and in causing the danger of sudden death. In 2 cases the effusion was in the right pleura and in 1 on the right side, being unilateral in all three. The fluid was withdrawn by aspiration in each case, but without any permanent benefit, as all succumbed from cardiac affection.

Out of the 21 cases of pleural effusions not connected with disease of the heart, which were aspirated, only 2 were followed by a reproduction of a purulent character. Four of the number were females and 18 were males. The pleural effusion occurred twelve times on the left side and eight on the right. It is believed that right-sided effusions are more liable to the formation of venous thrombi than the left. Trousseau considers that nearly all right-sided cases are of tubercular origin, but that opinion has been refuted by Bowditch and is not borne out by these cases. Of the 21 cases recorded, 5 died: 1 of pulmonary phthisis, 1 of tubercular meningitis, 1 of tubercular pleuritis and peritonitis, 2 of suppurative fever, and 1 of pulmonary œdema.

A series of cases with aspiration of the chest for pleuritic effusion, in some instances serous, in others purulent, numbering in all 69, has been reported by F. P. Porcher, ¹²June, '93 & June from the service of the City Hospital, Charleston, S. C. In one case 8 pints (4 litres) of purulent fluid was withdrawn from the thoracic cavity. In another case a solution of carbolized iodine was injected into a lung-cavity. In a large proportion of cases the accumulation was in the right pleura.

Porcher includes in his cases three operations of paracentesis pericardii attended with relief. From a consideration of the entire series, Porcher remarks: "The conclusion is forced upon us that throughout the country a vast number of cases escape detection and treatment, either medical or surgical."

He furnishes the reader some hints from Jaccoud: First of all, the side must be taken into account. In right pleurisies there is no immediate danger, as a rule, and, if the febrile process has not ceased, internal medication can be tried with a fair promise of success; but if the patient be not seen until it is too late,—that is, when all febrile disturbance is over,—then nothing can be hoped for from medicine, and aspiration becomes obligatory at once.

A case of empyema having some features of more than ordinary interest is reported by S. B. Kirkpatrick, ⁸⁵Mar. of Commerce, Texas.

Ben Walker, aged 22, and weighing not over 100 pounds (50 kilogrammes), had dullness all over left lung, posterior intercostal spaces bulging, with axillary temperature of 101.5° F. (38.61° C.). On March 23, 1888, a hypodermic needle was introduced into the sixth intercostal space, giving exit to pus. On the 24th aspiration in the eighth intercostal space withdrew 10 ounces (295 cubic

centimetres) of pus, when the needle became stopped up. On the 30th aspiration in the ninth and tenth spaces withdrew 25 ounces (775 grammes) of pus, and suspended on account of clogging of needle. On April 3d—pulse 120 and temperature 103° F. (39.46° C.)—quinine was given freely, and on next day pulse was 97 and temperature 98° F. (36.7 C.). On the 6th aspiration in ninth and tenth intercostal spaces withdrew 50 ounces (1500 grammes) of pus. On the 11th aspiration withdrew 24 ounces (710 cubic centimetres) of pus. On the 17th an incision was made in the eighth intercostal space, and a rubber catheter, being introduced, was attached to a Davidson syringe, giving exit to 16 ounces (500 grammes) of pus. The cavity was washed out with a solution of bichloride of mercury, 1 to 4000, a drainage-tube inserted, and external dressing with sublimate gauze applied. At night considerable bloody fluid was passing through the dressing (pulse 82 and temperature normal). The cavity was washed out daily for the first few days and afterward less frequently, but there was little discharge and no odor. April 27th the patient weighed 114 pounds (57 kilogrammes), and subsequently became hearty and stout, weighing 160 pounds (80 kilogrammes).

ABSCCESS OF THE LUNGS.

Simple abscess of the lungs, practically speaking, is, according to S. Seabury Jones, ⁹_{MAR. 2} liable to be met with in one of four forms: The first is that in which the symptoms are very obscure from the beginning, and remain so until there suddenly occurs a discharge of purulent matter. In the second form the symptoms resemble those of pleurisy with effusion, and in the third those of pulmonary tuberculosis. The fourth is that associated with the variety of pneumonia which advances slowly from one lobule to another, or is characterized by a tendency to skip from one lung to the other.

Abscess of the lungs is always accompanied with a degeneration of the general health, and alcoholism is, in his opinion, a prominent factor in its production.

When Jones encountered his first case, nine years ago, he was unable to find any reference to the subject whatever in any of the text-books. His second case was observed in 1886. The third case was one in which the symptoms resembled those of tuberculosis, but, as repeated examination of the sputa failed to detect at any

time the presence of the bacillus tuberculosis, the case was regarded as one of simple abscess of the lungs, and in a few weeks the patient regained his usual health and weight, although a small cavity still remained in the lung.

Lassen, of Kiel, reports 6 cases; Runeberg, of Sweden, had collected 8, all of which were operated on, and, including Jones's 3 cases, there were now on record 30 cases, exclusive of Graves's 6 successful cases.

ABSCESS OF THE MEDIASTINUM.

Mediastinal abscesses are attended usually with obstruction, to a greater or less extent, of air- and blood- channels from the pressure upon them, and are recognized by dullness on percussion over the region involved. An opening may exist, or bulging of the ribs with pulsation may occur, but such an accumulation in the mediastinal spaces may not reach the exterior surface, owing to the sternum in front and the spinal column with the heavy muscles behind, while abscess of the middle mediastinum must involve the lungs or the lateral spaces before coming into notice.

In the analysis of 111 cases collected by Hare¹¹² in 1887, the most constant and severe symptom of mediastinal abscess was pain, unless the formation was cold abscess, when the pain was a very unimportant factor. In both the acute and chronic form flashes of heat and rigors may occur, particularly the latter in the acute forms.

Pulsation may be perceptible by palpation and by the sensation of the patient from the pressure on large blood-vessels, and the sense of pulsation is intensified by the outside pressure upon the accumulation. Abscess of the posterior spaces may, by its pressure on the nerves as they leave the cord, produce violent pain in the anterior wall of the chest. Dysphagia is not so marked as in other growths of the chest. We find from Hare's cases it is nearly as frequent as cancer, which occurred in 136 cases of the 520 growths collected. Abscess is more frequent than sarcoma, of which only 90 occurred.

The conclusions arrived at are as follow: (1) that abscess of the mediastinum affects males more frequently than females in the proportion of 58 to 10; (2) that the anterior mediastinum is the most common seat for its development in the proportion of 48 to 19 instances of the disease in all the other spaces; (3) the proportion of acute to cold abscess was 48 to 31.

MEDIASTINAL TUMORS.

An instructive lecture upon primitive neoplasms of the anterior mediastinum was delivered by Letulle³_{Sept. 18} in the medical clinic at the Hôtel Dieu. He holds that primitive neoplasms of the anterior mediastinum under observation entitle them to recognition in nosological description, as their pathological anatomy and special characteristics are well defined; also that their symptomatology and clinical types are sufficiently clear for diagnosis and for prognosis.

Interesting observations by H. Mallet⁷_{No. 22} upon two tumors of the mediastinum are recorded. The first was a case of hæmorrhagic lympho-sarcoma, in a patient 46 years of age, without hereditary or collateral antecedents, which terminated fatally. The tumor presented an elastic and vascular extension in the posterior mediastinum, while its centre indicated a caseous degeneration with hæmorrhagic products in different parts. The second case was a lymphoma, in a woman 40 years old, who died under chloroform preparatory to an operation. An enormous tumor was found in the thorax, adhering in front to the sternum and behind to the vertebral column throughout the mediastinum. The upper border of the pericardium was encroached upon by the cancerous degeneration.

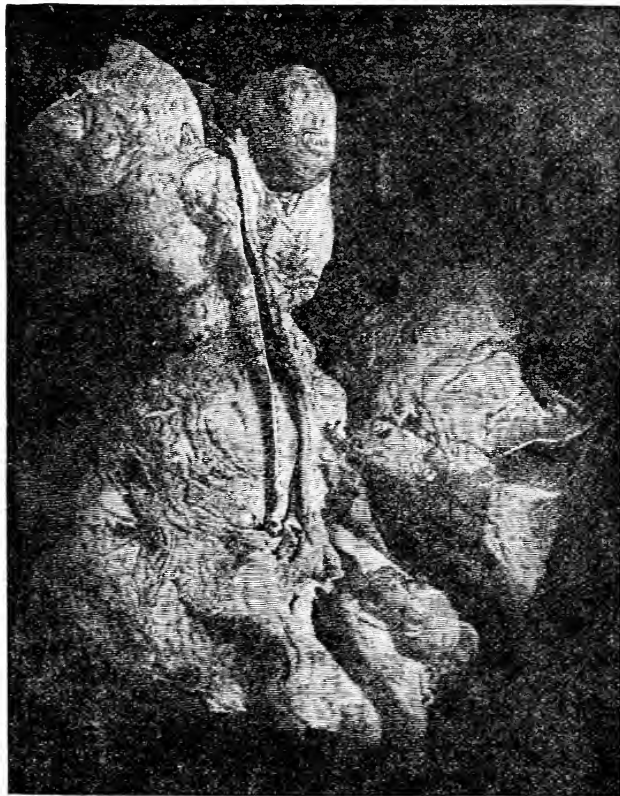
PLEURAL HERNIA.

A case of hernia of the pleura into the neck, under the care of George R. Fowler,⁹⁶_{May} is reported. A child of 3 months was attacked with acute bronchitis, and suffered greatly from violent paroxysms of coughing. A swelling upon the right side of the neck became larger when the child cried or coughed, and which almost entirely disappeared upon inspiration. In the course of a month a similar tumor made its appearance on the left side of the neck. She had constant dyspnoea and was aphonic. An attack of acute bronchitis supervened, which ended fatally in three days.

A post-mortem examination showed that the protrusions of the neck were but portions of an enormous sac connected with the upper part of the lung. When distended it occupied a large part of the right pleural cavity and anterior mediastinal space between the thymus and pericardium. The portion of the sac on the left side had found its way into the upper part of the *left* pleural cavity, displacing the lung and costal pleura on that side downward to the extent of 2 inches (0.051 metre). There was a rupture of the

primary branches which enter the upper lobe of the right lung, affording direct communication with the cavity of the sac.

In a paper read before the Congrès Français de Chirurgie by L. H. Petit the subject of air-tumors of the neck was fully considered.



TRACHEA AND LUNGS, WITH DILATED PLEUROCELE, AS SEEN FROM BEHIND.
(*Annals of Surgery.*)

The male sex seems most affected, as only 10 of the cases were females. In 58 males there were 30 cases of acute abscess of the anterior space, 4 cases of acute abscess of the posterior space, and 2 cases of acute abscess of the entire mediastinum. There were

also 2 cases in which the space was not stated. There were 20 cases of chronic abscess in the anterior space, 8 cases in the posterior space, and 1 case in the entire mediastinum. The most susceptible period of life was found to be from 20 to 30 years of age, the average being 25 years.

Chorel, of Brussels, ⁹⁹_{Nov. 7}, reports an interesting case of supra-clavicular hernia of the lung occurring in a child 3 years old. A tumor suddenly appeared above the left clavicle about the size of an orange, but becoming larger whenever the child cried. It was not tender, nor was the skin over it reddened or discolored. It



HERNIA OF THE PLEURA INTO THE NECK.
(*Annals of Surgery.*)

was completely reducible; on percussion it gave a tympanitic note, and on auscultation a soft, vesicular murmur was heard, together with somewhat prolonged expiration, indicating the presence of pulmonary emphysema. Reduction was made and maintained by means of a piece of card-board, well padded and fixed by a spica bandage. A complete cure resulted.

HYDATID CYST.

A. Pulido, ⁶³²_{FEB. 1} of Madrid, corresponding editor, furnishes an account of a hydatid cyst within the thorax, involved in great

obscurity at the outset. Ribera, of Madrid, demonstrated the difficulty of an exact diagnosis of tumors in cavities by a laparotomy in this case, which he had diagnosticated as a tumor of the pancreas or the epiploon; but the autopsy proved it to be a cyst of the pleura, with hypertrophy and inversion of the liver. Percussion and auscultation indicated that the air entered freely into the lungs of the patient, who was 10 years of age. The abdomen was enormously distended, principally above the umbilicus, the circumference being 95 centimetres (38 inches), while the vertical diameter of the tumor is 16 centimetres ($6\frac{1}{2}$ inches). There was fluctuation in the lower part of the abdomen, but not in the upper. The inferior outline of the enlargement is well defined. An exploratory incision in the linea alba, from the xiphoid cartilage below the umbilicus, exposed a firm, glandular-looking mass with adhesions, which induced a closure of the abdomen. An autopsy at a later period revealed the fact that this enormous tumor was the inverted liver, whose measurements were, in transverse diameter, 28 centimetres (11 inches); longitudinal diameter (anteriorly), 11 centimetres ($4\frac{1}{2}$ inches); longitudinal diameter (posteriorly), 20 centimetres (8 inches). The structure was not materially affected, and the dislocation was due to an immense protrusion of the diaphragm by a hydatid tumor of the pleura, which measured, longitudinally, 24 centimetres ($9\frac{1}{2}$ inches), and transversely 15 centimetres (6 inches).

DERMOID CYST.

A paper on a case of dermoid cyst of the right side of the chest, communicating with a bronchus, was read by R. J. Godlee⁶ at a meeting of the Royal Medical and Chirurgical Society. It was that of a lady, 30 years old, married, but without children. She felt a sudden pain some years previously, followed by pleurisy with effusion, which was converted into an empyema, bursting into a bronchus, and pus continued to be expectorated. At last some bulging and tenderness appeared in the right axilla. She was seen in consultation with Lauder Brunton, and after puncture with a needle had shown the presence of pus the cavity was opened. At a second operation the cavity was found to contain large masses of dark-brown hair, to be lined by skin, and to contain numerous skin processes from which hairs were growing. On a subsequent occasion the opening was much enlarged and the

most prominent of the projections removed, the rest of the surface, as far as possible, being treated with the actual cautery. The internal and external skin surfaces were united by sutures. A large vulcanite tube was retained in the opening, from which the discharge was thin and watery. There was no expectoration or cough. The stump of one of the projections obstructed the opening and was removed in the summer of 1888.

Godlee said that his object in making a free opening was to produce a large dry pocket that would not require dressing, but this anticipation was completely foiled by the process of healing. It was disappointing that the secretion should remain so copious, but it probably came from the bronchial tubes as well as from the cyst.

RESECTION OF THE STERNUM.

A patient of C. Ellsworth Hewitt¹⁰¹_{Nov.} had been suffering for two years with caries of the sternum and was also laboring under empyema. This man, 36 years old, presented dullness on the right side upon percussion, with swelling. The fourth and fifth ribs were unusually separated; there was dyspnœa and difficulty of lying on the sound side; fluctuation was present in the fourth and fifth intercostal spaces. An opening was made with the trocar and cannula between the fourth and fifth ribs, after making an incision through the skin and muscular structure with a scalpel. The cannula was withdrawn after the pus had escaped and the wound closed. Two weeks after this it was thought advisable to remove the diseased part of the sternum; before making an incision it was found that part of the fourth and fifth ribs on the right side were diseased. The sternal end of these ribs and about half of the gladiolus were removed. The patient was doing well after a lapse of eight weeks.

In regard to resection of the sternum, J. L. Roullies²¹⁹_{Aug. 8} gives an interesting account of 4 resections for traumatism, 14 for inflammatory and tubercular lesions, 5 for tumors, 13 for purulent collections or to ligate large arteries. The bone has been completely resected 4 times and partially 28 times. Among the latter he notes 20 complete cases, 3 incomplete, and 5 deaths. The principal accidents to be encountered are the opening of the pleural cavities, or the pericardium, and wounding the internal mammary artery.

RESECTION OF DISEASED RIBS.

A case of resection of the ribs and pleura for an osteochondroma of the ribs is reported by P. Bissenfeld, of Hamburg.<sup>69 96
No. 16, Aug.</sup> The operation was performed on July 16th. Flaps consisting of skin and muscular tissue were made and the eighth and ninth ribs exposed. It was then seen that the tumor surrounded the eighth rib. The periosteum over the eighth rib was dissected away for a distance of 5 centimetres (2 inches) in front and behind the tumor, and the bone was then cut through. The tumor was found adherent to the pleura and a portion of the latter had to be cut away, when air entered into the chest-cavity. The wound was closed by deep and superficial sutures, a strip of iodoform gauze having been previously inserted at its lower angle so as to insure drainage. An iodoform-gauze and moss-dressing was then applied.

The evening of the operation there was dyspnoea, which increased steadily and was followed by a cough on the second day. On the evening of the third day the temperature rose to 38.6° C. (101.5° F.) and the pulse to 140, but this rapidly subsided under proper treatment, and from the sixth day the pulse, temperature, and respiration were normal.

On the fourth day the dressing was changed and the strip of iodoform gauze replaced by a drainage-tube, which was removed on the tenth day. In four weeks the patient left the hospital completely cured, the lung having completely expanded again. The author has only found 16 cases of resection for new growths, and 5 of these died.

In a letter received by me from N. Senn, December 27, 1889, a somewhat similar case to the preceding is reported, in which he dispensed with drainage, with a satisfactory result.

He states that a man about 65 years old noticed four months previously a small swelling on the right lower part of the chest. The growth had reached the size of a hen's egg four weeks after. It was located near the cartilage of the tenth rib, was diagnosed as osteosarcoma, and, resection being advised, the patient entered the Milwaukee Hospital for that purpose.

Ether was used for anæsthesia. On cutting down on the tumor the incisions were extended so as to remove the germ of infiltration. The rib on the vertebral side of the tumor was denuded of periosteum and divided with bone-forceps about 1

inch (2.5 centimetres) from the margins of the growth. In attempting to remove the mass with blunt instruments the pleural cavity was opened and air rushed in, causing collapse of the lung. The tumor, with a portion of pleura, was excised, cutting through the costal cartilage with the same scissors, thus exposing the collapsed lung to view. An antiseptic compress occluded the wound while the sutures were introduced and tied. Antiseptic dressing without drainage. The patient being threatened with collapse, the anæsthetic was suspended and stimulants administered, with a favorable result. The wound healed by primary union. The day after the operation the lung had partially expanded, and on the third day no signs of pneumothorax could be detected. The tumor, on microscopic examination, was found to be a round-celled sarcoma, intimately adherent to the costal pleura. Prior to operation adhesions should be secured by stitching the pleural surface around the tumor.

PERICARDIAL EFFUSION.

Puncture versus Incision.—In the course of a paper on pericardial paracentesis, Ferrier ^{67, 99}_{Nos 6, 8; Nov. 7} gives the following indications for surgical interference in cases of pericardial effusions: 1. When the exudation is dangerous owing to its abundance; in case pleural effusion also exists, the latter should be first evacuated. 2. When, even if small in amount, it shows no tendency to subside, and from its chronic course exposes the heart to fatty degeneration. 3. When the effusion is purulent, and might give rise to septic conditions.

Out of 22 cases collected, 20 died from eight hours to seven months after operation; the other 2 cases recovered.

In hæmorrhagic pericarditis better results have been obtained, as out of 9 cases 5 have been saved.

Simple aspiration is sufficient when the exudation is serous; but of 15 of purulent effusion 11 treated by puncture died, while of the remaining 4, in whom incision and free drainage was practiced, 2 recovered, with the addition of another recently reported.

The puncture should be made in the fourth or fifth interspace to the left of the sternum, and the same interspaces should be chosen when a permanent opening has been determined on. In both the successful cases the pericardial sac was injected.

OPERATION FOR EMPYEMA.

The use of an aspirator, with the needle passed at the upper margin of a rib in the intercostal space nearest the accumulation, should afford relief in recent cases of empyema; but when the collection is prone to return this will not suffice, and it becomes necessary to make a free incision and introduce a drainage-tube, with a resort to antiseptic solutions for washing out the entire cavity of the pleura. In the first instance it is sought to exclude the atmosphere completely, and the success of this process depends upon producing a partial vacuum, which induces the expansion of the lung. But in the latter procedure there is no expectation of securing immediate restoration, and our measures look to gradual obliteration of the pus-cavity, with more or less impairment of respiration on that side of the chest. If the drainage is not effected satisfactorily through a free incision, it then devolves upon the surgeon to remove a portion of the rib, or even make an entire resection of the rib, for the purpose of complete evacuation of the sac.

An important precaution in securing the tube for drainage, so as not to escape into the cavity, is enforced by accidents which have occurred on several occasions in the hands of otherwise skillful operators from the dropping of the drainage-tube into the pleural cavity. The cord or ligature of strong thread, passed through the wall of the tube with a needle and brought out at the end, should be carried around the body and knotted securely to prevent its escape or to withdraw it in case it should drop in.

A valvular tube has been devised by William Williams^{187 July} for taking away of the atmospheric pressure from the external surface of the lung while the opening in the chest-wall still remains. It is claimed that this enables the organ to fulfill its functions, and to fill up its side of the chest from the first, without waiting for any falling in of the side to take place. The method is as follows: A rubber tube, a yard and a half in length and of a thickness that will admit of its being introduced through a cannula of the ordinary size used to open empyemas, is taken, and one end is introduced into the chest by this means; over the tube, starting from the free end, is next run up an oval, slightly-curved—concave toward the chest—metal plate or shield, 3 by 2 inches (7.6 by 5.0 centimetres), having a metal tube $\frac{1}{2}$ inch long, soldered in a hole in its centre and projecting on the convex side only; through this the

drainage-tube passes as the shield is run up to the chest, and they should, of course, fit each other air-tight. Now, between the plate and the chest a dressing of stiff ointment is placed so as to form an air-tight joint when the whole is finally firmly strapped down and bandaged. Turning again to the free end of the drainage-tube, we fix on it, by means of a piece of glass tubing, a valve that opens outward, and the contrivance is complete. By gradually shortening the end of the tube extending from the shield into the chest the opening is made to heal out after it, the pleural surface healing first. This may be effected by drawing the tube out by degrees through the shield.

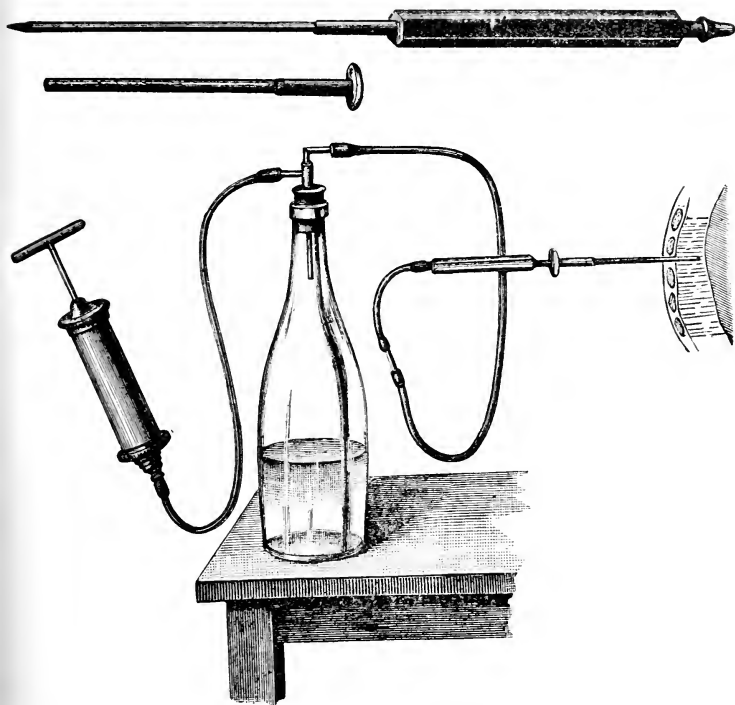
From the time that Potain and Dieulafoy advocated the process of puncturing and aspirating, an infinite number of aspirating instruments have been proposed, and it would seem useless to increase their list. However, Debove had one lately constructed by Galante, which appears to be a very commodious contrivance. Its advantages are thus briefly enumerated ⁷³_{MAR. 30} (translated by E. Van Goidtsmann, of Atlanta):—

1. As regards the trocar, first, it is entirely made of metal, whilst other trocars are provided interiorly with a small leathern rundle, and their antiseptic cleaning cannot be effected without incurring the danger of deterioration; second, it is provided with a sheath and a mandrel connecting a solid trocar into a hollow one through a simple rotary motion, and this is done with so little trouble as to require the use of but one hand; third, it is provided with a handle in order to facilitate its manipulation.
2. The tubes connecting the trocar with the bottle and pump are of India rubber, with no cocks attached thereto. These tubes are adjusted with gentle friction to fitting nipples, and the apparatus constitutes a whole whose parts are rendered secure against separation from each other during the operation.
3. The pump is aspirating only. I have witnessed a number of accidents resulting from the use of forcing- and aspirating- pumps. Operators have but too often forced back a liquid which they intended to aspirate.
4. Finally, my apparatus offers another advantage. It is considerably cheaper, by reason of its simplicity, than those actually offered by the trade.

Nönchen describes a thoracotome, with cannula,_{J.M.} which for four years, in about 20 cases, has always given him good results,

and is well fitted for private practice because of its easy and simple mode of employment.

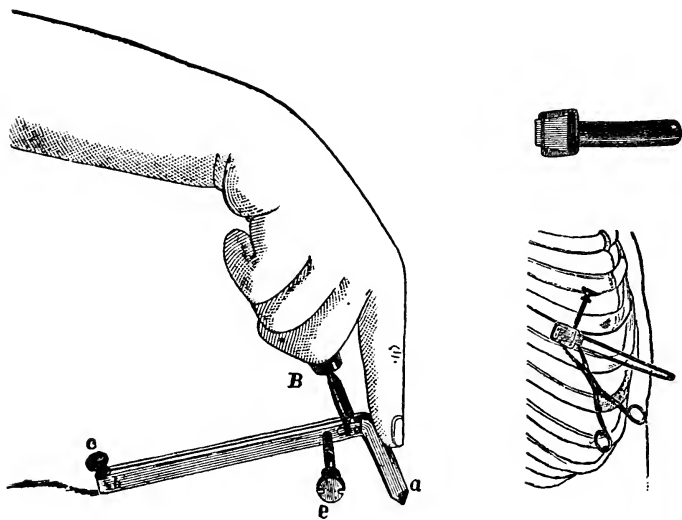
His description of it, translated by M. B. Hutchins, of Atlanta, is as follows: "It is made of two rectangular-bent arms, of well-hardened steel, which terminate at one end in points, *a* (see next page), while the other ends, *b*, are connected by a hinge



DEBOVE'S ASPIRATING SET.
(*Progrès Médical.*)

which bends around the removable rivet, *c*. Just anterior to the bend is a notch, *d*, for reception of key, and beneath this notch a small rivet holds both arms in proper juxtaposition. The screw, *e*, whose socket is in one arm, presses, by turning against the other, and separates them. On head of screw is a groove in which the key fits, facilitating the turning. I use also, besides, a silver

cannula, with small plate shoulder (2 to $2\frac{1}{2}$ centimetres—0.79 to 0.99 inch), upon which a piece of elastic bandage is fastened with silver wire. This piece has not quite the width of the plate, is placed over the opening of cannula, and reaches through with the under end beneath the bridge (!), so that a valve-like closure of the cannula occurs. The cannula is 2 centimetres (0.79 inch) long and has a diameter of 7 millimetres (0.27 inch). For lengthening, a drain about 5 centimetres (1.97 inches) long is bound over this. The use



NÖSCH'S THORACOTOME, WITH CANNULA.
(*Illustrirte Monatsschrift für Aertzliche Polytechnik.*)

is in this way: One places the key in the notch, *d*, and pushes the instrument into the desired place of drainage. When the instrument reaches the thoracic cavity, pus comes out on it (instrument.) One now screws the points so wide apart that he can easily pass the cannula in with forceps. This done, one draws the rivet, *c*, out, separates the arms, and puts the key between and draws on their long axis. Now, while one draws out both parts of the instrument singly, he must avoid removing the cannula at the same time. I protect the skin by a gauze compress, spread with

boric ointment, placed under the plate, and prevent the slipping out of the cannula through some circular turns of absorbent bandage."

A moss-pad dressing absorbs the discharging pus. This little operation demands no narcosis, and can be completed, including the dressing, in a quarter of an hour without physician's assistance. The time of healing averages about five weeks. The cases in which the instrument was employed were mainly children, yet there was an adult among them with pyo-pneumothorax who recovered completely.

In pyo-pneumothorax, as well as in empyema, through drainage has been adopted, according to the plan of Chassaignac. It is essential that one of the openings shall be in the most dependent part of the thorax, with regard to the position of the patient. If in bed, one should be in the axillary line; if not, it may be made behind and about 4 inches (10 centimetres) below the angle of the scapula and the same distance from the spines of the vertebræ. The cavity should be washed out twice daily, and a drainage-tube used for the escape of matter. The success of treatment depends upon a free exit for the matter so soon as it forms, but nutritious and even stimulating diet should be enforced. It is held that the percentage of cures from through drainage may be fairly placed at 75 per cent.

PNEUMOTOMY AND PNEUMONECTOMY.

In destructive inflammation or necrosis of the pulmonary structure pneumonectomy and pneumonotomy have been resorted to recently in Russia, showing that an entire lobe or part of a lobe of the lungs may be removed without serious inconvenience to the subject. We are prepared to accredit these reports from the pathological results in some cases of phthisis pulmonalis, bringing about a complete disorganization of a lobe of the lungs, rendering it entirely incapable of performing its functions subsequently.

Medical literature contains at present 18 cases of pneumonotomy for pulmonary abscess, 9 of which recovered. In 6 of the 9 a complete recovery ensued, while in 3 a fistula remained. The number saved was about the same where there was communication with the pleural cavity and where there was none.

The most notable advance in lung surgery is afforded by these cases of pneumonotomy, with the experimental researches

on the inferior animals, especially upon rabbits and dogs, for pneumonectomy.

Pneumonotomy was practiced by W. Koch for von Openchowski, of Dorpat, ¹¹⁴_{B.16,H.3,4} in the case of a male peasant, 30 years old, who had caught pleuro-pneumonia four months previous to his coming under observation. A right-sided pulmonary abscess was diagnosed, and a rapidly-increasing gangrene around the abscess supervened, with aggravation of the patient's general condition. Koch resected the fifth and sixth ribs, removing from each a portion 10 centimetres (4 inches) long. The pleuræ being adherent, thermo-cautery was passed into the lung, reaching a cavity at the depth of 2 or 3 centimetres ($\frac{3}{4}$ or $1\frac{1}{4}$ inches). Offensive green pus flowed freely from the wound. A necrotic focus was found on the inner aspect of the cavity and a large bronchus communicating with the abscess. The necrotized tissue was removed with the fingers, and the remaining surface was supplied with a pyrogenic membrane. After cauterization with the thermo-cautery, the cavity was washed out with a weak solution of permanganate of potash, a drainage-tube inserted, and antiseptic dressing applied. Irrigations were repeated daily and the drainage removed on the thirty-eighth day.

The man was dismissed quite well on the eighty-first day, and upon examination one and a half years afterward the respiratory sounds were less than on the opposite side, but quite distinct everywhere.

The author concluded that pneumonotomy sometimes represents the only means of safety in pulmonary abscess.

Pneumonectomy has been brought to the attention of the profession in Russia by Zakharevitch, ⁹⁶_{Apr.} He has made 13 experiments on rabbits, 11 on dogs, and 9 on the human cadaver. Having made a subperiosteal resection of from one to four ribs, he drew a portion of the lung out of the wound, tied its roots with silk, cut it away, applied iodoform, returned the stump, stitched up the wound, and used a Listerian dressing.

The 13 operations on 9 rabbits were only fatal in 2 cases. The 11 operations on 7 dogs gave 3 deaths. After 2 operations in one of the dogs it lived four years and then died from an accident.

The remaining portion of the lung operated upon proved to

be always considerably enlarged. The liver and heart are nearly always found similarly enlarged. An animal possessing healthy lobes on one side of its chest may be subjected to a total pneumonectomy on the opposite one, with good chances for a long life afterward. But if only one lobe is in a healthy condition on either side of the chest, neither of the lungs can be operated upon, since opening the thoracic cavity on one side is followed by primary collapse of the corresponding lung. It is inferred that both experiments on animals and already published cases of surgical treatment of pulmonary cavities in man may completely justify a more active operative interference in various regions of the pulmonary tissue.

The profession is urged by Zakharevitch to prosecute these investigations for the practice of pneumonectomy.

The human cadaver has been made subservient for the elucidation of the mode of proceeding in this operation upon man. It has been determined by the author that, in view of the fact that the root of the upper and middle lobes of the lung corresponds to the third intercostal space and that of the lower one to the fourth, it is requisite in a case of extirpation of the upper two lobes to excise the second rib, and in that of the lower the third rib. The best drainage can be secured by establishing a counter-opening in the eighth intercostal space along the scapula or posterior axillary line. It is advisable to excise fairly-long pieces of ribs and to make a free incision into the cavity, in order to secure both a thorough removal of its contents and a thorough disinfection of the parts. Moreover, free resection and incision promote a speedy and satisfactory obliteration of the cavity.

At a meeting of the American Pediatric Society, September 21st, Joseph O'Dwyer⁵⁹_{Oct. 12} read a paper on the apparent physical contradiction involved in the re-inflation of a collapsed lung, while an opening remains in the pleural sac. Among other theories he considered the power of the normal lung to inflate the collapsed lung by coughing and sudden forcible expiration; but this did not afford a complete explanation, because in such cases the lung should immediately re-collapse, which it did not do; and, again, because in cases of double empyema with an opening in both pleural cavities, instead of death from asphyxia, the lungs expanded well.

MISCELLANEOUS OPERATIONS.

In the treatment of purulent pleurisy by puncture, frequently repeated, Desplats¹⁸⁵_{Apr.} lays down the following rules: 1. If you suspect a purulent exudation, immediately make exploratory puncture. 2. If the exploratory puncture reveals the presence of pus, evacuate it immediately. 3. The pus being evacuated, the formation of a new collection should be prevented by frequent punctures. 4. If the punctures be not sufficient, apply a permanent drainage-tube. 5. If you find a septic cyst, and the pus takes on a gangrenous odor, open extensively at once. In this case only should antiseptic washes be used.

The method of the operation in empyema used by E. Küster⁶⁰_{Nos. 10 to 13; June}¹⁰¹ is as follows: After exploratory puncture, an incision is made on the front of the chest, usually in the fourth or fifth intercostal space, and along the upper margin of the rib, so as to avoid hæmorrhage. When the pus escapes, a silver sound is introduced into the chest and carried to the deepest part of the cavity behind. The knob of the sound is now pressed firmly against the chest-wall, so that it can be felt in the intercostal space, and the rib above is resected.

If any space is left between the diaphragm and chest-wall that is not sufficiently drained, the incision is enlarged outward and downward until the sloping surface of the diaphragm passes directly into the opening. The thoracic cavity is then washed out with salicylated water under slight pressure, and a long drainage-tube is passed transversely through the chest. The wound is then tamponed with iodoform gauze.

Küster gives the statistics of 109 cases operated on by this method. Sixty cases recovered, 17 were unimproved, and the others terminated fatally. These cases are grouped as follows: 1. Non-complicated empyema (traumatic, and secondary to pneumonia, measles, scarlatina), in which the operation was made in the first six weeks. Of 39 cases 34 were cured, 1 unrelieved, 4 died (1 of carbolic-acid poisoning). These results are the best yet obtained. 2. Non-complicated empyema, in which the operation was performed after six weeks. Of 17 cases 11 were cured, 3 died, and 3 were unrelieved. 3. Cases in which no operations or a simple incision had been made and thoracic fistula resulted. This group comprises 15 cases, with 7 recoveries, 5 deaths, and 3 failures.

4. Cases of empyema in tuberculous patients, of which 31 were treated, giving 6 cures and 14 deaths. Death, however, was not due to the operation, but to pulmonary tuberculosis or to amyloid degeneration. No irrigation is required after the operation if the incision has been at the proper place. The first dressing is allowed to remain six or eight days.

F. Eklund, of Stockholm, Sweden, corresponding editor, reports that Runeberg⁶⁷⁸_{Nor.} has performed 15 operations for the cure of empyema, 13 of which were successful. Of these 13 cures, 10 were males and 3 females. Their ages were as follow: 2 of 6 years, 1 of 11 years, 2 from 15 to 20 years, 6 between 20 and 40 years, 1 of 49 years, and 1 of 52 years. The shortest time which elapsed between the operation and the cure was seventeen days. This occurred in a little girl 6 years old. In all the cases incision was the mode of operation adopted by him. The duration of the disease had no influence in causing a corresponding retardation of the healing process and final cure after the operation.

With respect to the after-treatment, Runeberg has, with good reason, within the last few years, abstained from washing out the pleural cavity. He never resorts to this proceeding except in those very exceptional cases of long standing that overtax his patience with the treatment.

It is considered to be of paramount importance to give a free outlet to the contents of the pleura through antiseptic material composing the dressing.

A new thoraco-plastic operation has been done by a Russian surgeon, M. Subbotin,⁵⁹⁶_{No. 42, '88; Apr. 13} which is described as follows: A segment from 2 to 3 inches (0.051 to 0.076 metre) long is first resected from the seventh rib, as usual, the pleural cavity being opened and washed out. This opening is then plugged with gauze to prevent infection of the wounds still to be made. A vertical incision about 5 centimetres (2 inches) long is next made along the outer border of the pectoralis major muscle. Through this the sixth, fifth, and fourth ribs are exposed without being denuded of periosteum, and from each of them a little wedge is removed by means of Liston's bone-scissors, so that the rib is made movable. A similar vertical incision is then made in the posterior axillary line, serving for the exposure and division of the same ribs in this situation. These two incisions, not

opening into the pleural cavity, are sutured without drainage. The portion of ribs lying between the two points of section are thus enabled to sink in, and, when healing has taken place, they protect the thoracic cavity and at the same time serve as supports to the vertebral column.

John R. Lunn²_{Mar 23} reports 3 cases of empyema treated by resection of part of a rib. The patients, aged respectively 3, 5, and 15, recovered, but in each case spinal curvature developed subsequently on the affected side. This was treated by Sayre's jacket, the plaster being applied while the patients were slung in a kind of hammock, after the plan recommended by R. Davy.

AFTER-TREATMENT OF THORACIC OPERATIONS.

In regard to the after-treatment of operations for empyema, a paper, translated by Herman Mynter, states that Runeberg⁴⁹⁸_{v. 28, p. 302} commenced, after 1883, to irrigate the cavity in operations for empyema once only—immediately after the evacuation. This method was given up from the fall of 1885, and in 17 cases since treated no irrigation has been used. The author has treated 27 cases, of which 10 were irrigated once, immediately after the operation. Of these 1 died, a man 63 years of age, who suffered from valvular disease of aorta, and died of pneumonia; 2 left with a permanent fistula, and 7 recovered. Of the 17 treated without irrigation, 1 left in five weeks (on his own demand) with a fistula not perfectly healed; all the others recovered. Recovery occurred in an average of seventy-one days after the operation; the shortest time was five and one-half weeks; the longest, five and one-half months.

Most authors are inclined to believe that the longer the empyema has lasted before the operation, the less prospect is there of an early recovery. The author does not agree with this statement. Of the 23 perfectly-cured patients, 9 were operated prior to one month's duration of the disease. Of these only 3 were cured in the course of two months; with the others it took longer time,—in 2 cases, respectively, one hundred and fifty-seven and one hundred and sixty-six days. If the disease had existed two to three or even five to six months, the recovery took place earlier. With a duration of from nine months to several years the recovery took longer time after an operation.

The patients' ages may have some influence on the duration

of the convalescence, which, probably, is shortest in childhood. The average duration in 9 patients operated in 1884 and 1885 was thirty-eight days; in 14 patients in 1886 sixty days, and in the last 7 forty-five days. When tuberculosis was present no operation, save a simple puncture, has been performed.

The omission of irrigation, to say the least, had no unfavorable influence on the recovery. It is not improbable that repeated irrigations may cause a permanent fistula. Commencing adhesions are torn, thus interfering with the union of the opposite layers of the pleura.

If the collection of pus is circumscribed, the fistula, of course, must be made when it is necessary. The operation is always continued with the resection of the sixth rib, sometimes, also, of the fifth and seventh. Should the intercostal arteries be wounded, plugging with gauze may be requisite. After the pleural cavity has been opened it ought to be evacuated slowly, to avoid too quick changes in the intra-thoracic pressure. The most important thing in the after-treatment is to make provision for perfect evacuation of pus, and a counter-opening may become necessary for thorough drainage. The drainage-tube can only be safely removed when a cavity no longer exists. If the cavity ceases to decrease, injection of tincture of iodine may stimulate the process of granulation. If this does not succeed, it may be found requisite to make extensive resections of ribs.

Basil holds mostly the same opinion as Holsti. He considers irrigation of the pleural cavity in adults a dangerous proceeding, which ought to be performed in each case only on special indications. As irrigating fluids he recommends weak solutions of boracic acid, creasote, corrosive sublimate (1 to 8000, or 1 to 6000 if the condition of the patient be such that no danger would occur from a possible diarrhœa).

Fräntzel¹⁷⁰_{Apr.} condemns the operation in empyema when the wall of the thorax is stiff and unyielding, in which the lung cannot expand.

A practical paper on "The Association of Pericarditis with Empyema and the Effects of Incision into the Pleural Cavity," by Rickman John Godlee,¹⁵_{Feb.} is illustrated by drawings of the anatomical and pathological relations of the thoracic structures, which are here reproduced, with the descriptions. The normal

situation of the pleura behind the sternum may be easily observed by taking away the front of the sternum with the pleura and with the anterior layer of the pericardium also attached. Accurate representations of such proportions drawn to the same scale are shown in Fig. 1 and Fig. 2, the former from a child and the latter from a woman. In both the internal mammary vessels were previously injected, and it will be observed that in the child they approach very close to the lower end of the sternum.

The natural line of the anterior border of the pleura is very nearly symmetrical on the two sides; that is, it does not follow the

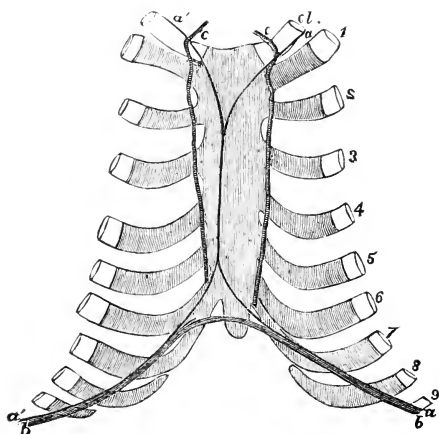


FIG. 1.—PERICARDITIS WITH EMPYEMA.
(*The Practitioner.*)

V-shaped notch of the left lung, but slopes away as it does on the right side, from the mid-line of the sternum opposite the third cartilage to the juncture of the sixth cartilage with the sternum. In a child the pericardium may not actually touch the sternum at all, the two pleuræ meeting behind it and forming a sort of meso-pericardium. The lateral mobility of the pleuræ is also very remarkable. In the preparation from which Fig. 1 was made it was easy to move the anterior edges of the right sac opposite the third interspace $\frac{3}{4}$ inch (2 centimetres) to the left of the sternum, whilst that of the left could be made to reach the right border of the sternum. It is thus obvious that in the healthy state a puncture

quite close to the edge of the sternum would not, with certainty, avoid the pleuræ; but it is highly probable that when pericarditis with effusion exists, the left pleura, at all events, in this part, will have become obliterated, and this is no doubt one reason why no cases of pleurisy following paracentesis pericardii are recorded. If, on the other hand, the healthy pleuræ were traversed by the knife in making a free incision into the pericardium, there would be, at least, a risk of pneumothorax.

A simple and graphic experiment may be made to illustrate

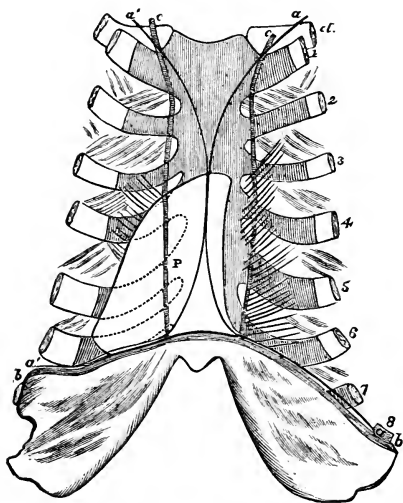


FIG. 2.—BACK OF STERNUM AND RIB CARTILAGES OF A WOMAN; THE FRONT OF THE PERICARDIUM IS LEFT ATTACHED.

(*The Practitioner.*)

the position of the heart in the pericardium when the latter is forcibly distended, but we must be on our guard against assuming that such a dead-house experiment may be exactly copied in the living body. If a perforated needle be inserted into the pericardium from beneath the xiphoid appendix without opening the body, it may be injected with colored gelatin, and, after this has been allowed to cool, the part in which the fluid has accumulated may be accurately observed. Figs. 3 and 4 were taken from such a preparation. Fig. 3 shows simply the outline of the distended

pericardium before it was opened; Fig. 4, the appearance of the heart as seen through the gelatin. It will be seen that the heart is displaced upward and outward.

The gelatin on the front of the heart was very thin; in no place more than $\frac{1}{4}$ inch (2.5 centimetres) thick, and that only at the left border. The lower border of the right ventricle came close to the surface, and there was no gelatin in front of it at all.

If the needle be introduced to the left of the sternum it should be directed to the right and backward. If, on the other

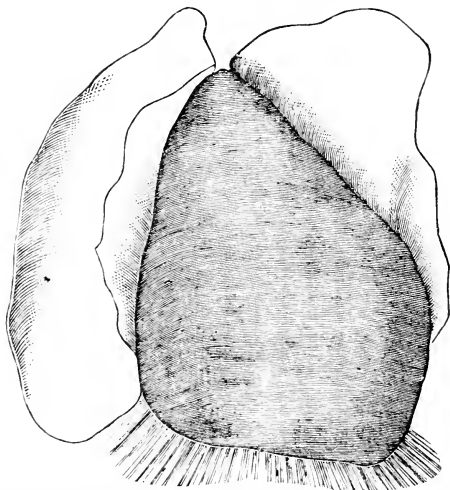


FIG. 3.—PERICARDIUM DISTENDED WITH GELATIN; THE LUNGS TURNED ASIDE SO AS TO DISPLAY THE WHOLE OF THE ANTERIOR SURFACE.
(*The Practitioner.*)

hand, the puncture be made to the right of the sternum the cannula should be directed backward and to the left.

The puncture should be made as low as possible, and if it seems otherwise necessary to select a high interspace,—say, the fourth instead of the fifth,—great care must be exercised in introducing the trocar, as it is quite likely that the heart may be touching the front of the pericardium, even although there may be very considerable distention.

The author proceeds with the statement that the possible mischief which may result from the opening of the pleura, in the

attempt to reach some deeper structure, includes, of course, one of two things: 1. The occurrence of pneumothorax. 2. The induction of pleurisy.

It is conceivable that a simple incision through the chest-walls, even though both lung and pleura may be healthy, may not be immediately followed by the falling away of the former. But once admit a little air into the pleural cavity, either by the act of coughing or by the insinuation of a finger, and the lung will at once drop away, producing a complete pneumothorax.

Godlee¹⁰⁸⁴ quotes as follows:—

“Collapse of the lung, partial or complete, unless the organ is already adherent to the thoracic walls, sooner or later follows upon an opening larger than the glottis being made into the pleural cavity. If the wound is small, or if it is at a distance from the free margin of either lobe, the expanded lung remains in contact with the costal pleura, and often remains long enough for adventitious adhesions to form. When the lung collapses, unless compressed by liquid effusion, it generally is partially expanded by air passing from the sound lung into the trachea, and thence, on closure of the glottis, into the bronchi of the wounded side. It is inflated in expiration and not in inspiration.”

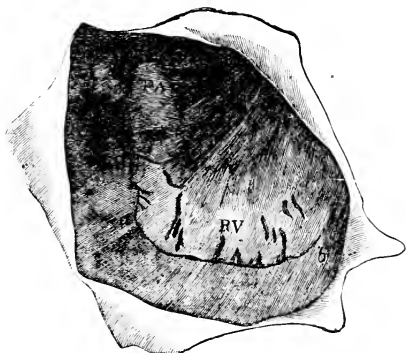


FIG. 4.—THE SAME PERICARDIUM OPENED.
A, pulmonary artery; AA, right auricular appendix; RV, right ventricle;
a, b, lower border of heart.
(*The Practitioner.*)

A. H. Smith has suggested that the occurrence of this expansion, leading, as it sometimes does, to an actual protrusion of the lung through the opening, might be made use of by invoking the voluntary aid of the patient in more or less completely expelling the air of a pneumothorax from the chest.

In this connection reference is made to a very interesting summary of 7 cases of hernia of the lungs that occurred during

the American war, 4 of which recovered. It has several times been found impossible to return the lung into the chest, and the protruding portions have been removed by the application of a ligature to the base of the protrusion. After the separation of the slough cicatrization has taken place without subsequent damage to the patient.

In discussing a paper on empyema, A. Cabot⁹⁹ remarks that in his experience cure by repeated aspirations was rare except when there was free expectoration and discharge of pus through the bronchial tubes. Among the changes from delay in aspirating he considers, first, the loss of the patient's strength, and, secondly, after aspiration the lung collapses and the pulmonary pleura adheres to the costal pleura; should we then have to open the chest we have a cavity which the lung cannot fill up. He recalled

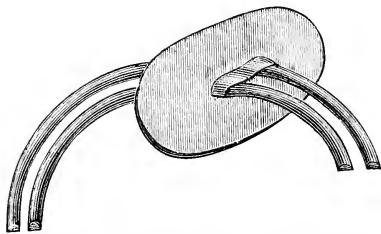


FIG. 1.—RUBBER PLATE FOR PLEUROTOMY.
(Gallet.)

a case of empyema following pneumonia, in which there was free expectoration of pus and foul material. After the lapse of some weeks an opening was made into the chest, through which fully one-third of the lower lobe of the lung came out as a big slough. After three months there was good respi-

ration audible to the base, with but slight diminution in the measurement of the affected part, and the patient made a good recovery.

An admirable monograph has been published by A. Gallet,¹⁰⁸⁵ of Brussels, upon the operative measures to be adopted in empyema, and especially treating of antiseptic pleurotomy and Estländer's operation. Some of the illustrations may prove instructive in connection with a general summary of the contents, and are reproduced.

An exploratory puncture should precede pleurotomy. This puncture is facilitated by a very small incision of the skin with a lancet. Pleurotomy is made in the sixth intercostal space to the seat of the axillary line. The pus is evacuated, and a double drainage-tube is introduced through the wall, passing in a rubber plate. This is as large as the palm of the hand, and fitted to the outline of the chest, as shown in Fig. 1.

Immediately afterward the cavity should be washed out with a solution of phenic acid, of 10-per cent. (?) strength. Precautions are requisite that the injected liquid shall not accumulate in the cavity. When the fluid returns clear the injection should cease.

It is not necessary to make two openings in the chest; a

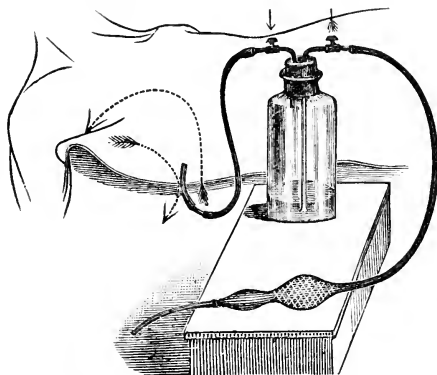


FIG. 2.—FLASK FOR WASHING THE CAVITY.
(Gallet.)

simple incision, as in ordinary pleurotomy, will suffice. A flask is used with a stopper having two openings and one tube descending near the bottom of the vessel, in which there is a solution of phenic acid of 5 or 10 per cent. (?) in strength. The other tube descends only a short distance in the vessel, and does not reach

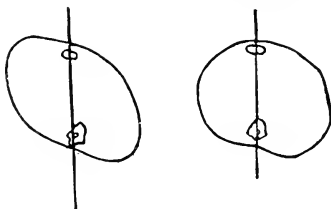


FIG. 3.—DIAGRAMS OF SECTION OF CHEST IN PLEURITIC EFFUSION AND SCOLIOSIS.
(Gallet.)

the surface of the fluid. The first tube communicates at its exterior end with a ball-valve. The second tube communicates by its exterior end with a point that penetrates deeply through the skin or in the drain. The opening of the wound should be sufficiently large to permit of the escape of gas and *débris*.

As a result of operations for empyema the author refers to the effect upon the spinal column inducing lateral curvature, the concavity being toward the affected side. The question has been raised in regard to this being a veritable rotation of the vertebræ. He is inclined to the view that the rotation occurs in this as in other cases of spinal curvature, but very slightly, and not to be compared with the rotation which accompanies the lateral curvature of rickets from other causes. In his work on the treatment of empyema Godlee gives an outline of the situation of the vertebræ

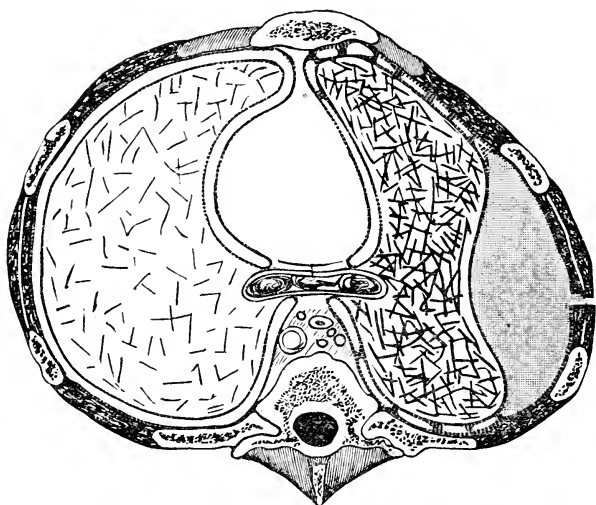


FIG. 4.—SECTION OF CHEST IN EMPYEMA, ON A LINE WITH FIFTH DORSAL VERTEBRA.
CUTANEO-PLEURAL FISTULA, SHOWN BETWEEN THIRD AND FOURTH RIB.
(Gallet.)

and the aspect of the chest in the subjects of pleuritic trouble and from rickets.

The principal factor in producing this phenomenon is the thickened pleura. When a resection of the ribs is made the fragments tend to unite and the pleural membrane assumes a cartilaginous aspect. It is here claimed by the author that the dense pleura is the cause of the sinking of the thoracic wall.

Fig. 4. The cavity shown by cross-hatched lines is of moderate size. The parietal pleura is considerably thickened, as seen in the

dotted lines. It has contracted numerous adhesions with the visceral pleura as shown by the dotted lines, and is in like manner thickened. Under these conditions the lung performs its function. The operation of Estländer is indicated.

Fig. 5. The cavity (cross-hatched lines) is very large. The costal pleura (dotted lines) is considerably thickened. It has formed some adhesions with the visceral pleura, shown by dotted lines, in like manner greatly thickened and retained in a fold. The lung rested in the costo-vertebral space.

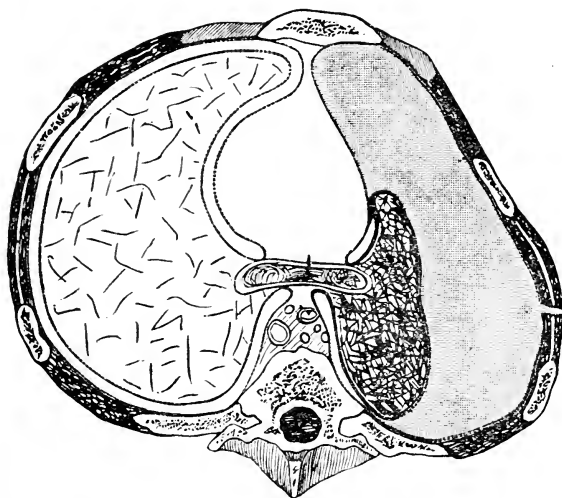


FIG. 5.—SECTION OF CHEST IN EMPYEMA, ON A LINE WITH FIFTH DORSAL VERTEBRA.
LUNG COLLAPSED AND INACTIVE.

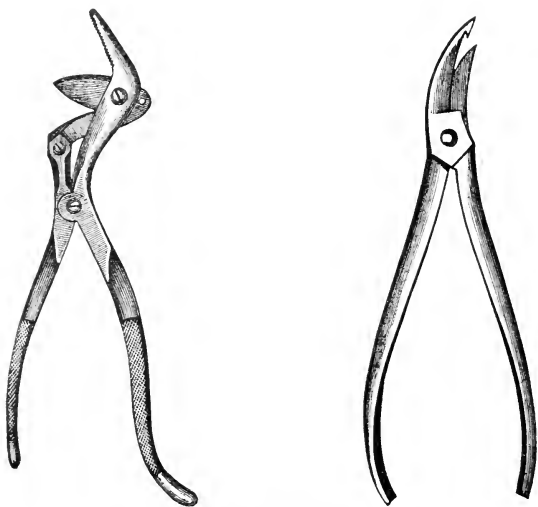
(Gallet.)

Among the instruments required for operating, the author has employed a curette, which serves for detaching the periosteum from the rib and also to facilitate the passage of the beak of the cystotome. This instrument has in its extremity an opening, which admits of the attachment and the easy passage of a chain-saw in the cases where it is requisite to use this means of dividing the rib.

Of the many inventions for dividing the ribs, the instrument based upon the principle of a lever is most employed, known as

the cystotome of Sreisguth. The two handles being seized, the bone is divided at one stroke.

The angle of this instrument may be inserted in the eyelet of the curette which we have described. In this way the curette, when placed under the rib, on being withdrawn, admits of the



LEVER CYSTOTOMES.
(Gallet.)

introduction of the beak of the cystotome without wounding the adjacent tissues. If it is not practicable to divide the ribs with these instruments, the chain-saw may be used.

Having observed antiseptic precautions and washed out the field of operation, noting the extent and site of the cavity, the curette of Rhinstaedter is introduced and used with gentleness in every



RHEINSTAEDTER'S CURETTE.
(Gallet.)

part of the pleural sac. In the meantime a tepid antiseptic solution is injected for cleansing the walls of the abscess, and when it returns clear the irrigation and curettage cease. Afterward a small

portion of iodoform is blown into the sac, leaving the cavity in excellent antiseptic condition.

When the walls of the sac are brought in contact by the resection of a certain number of ribs, nothing prevents the union, rapidly and definitely, of the portal and pulmonary pleural membranes. Should the orifice of a fistula not be sufficiently open, it may be dilated by laminaria tents, or even enlarged by a stroke of the scalpel. The mobility of the thoracic wall is the chief end to be gained in surgical interference.

A judicious and practical treatise upon the surgery of the pleura and lungs by Hofmokl,³⁹⁷_{B.3.H.6} of Vienna, presents the history of 60 cases of thoracic disease with grave features, excluding those of simple serous effusion.

He insists that puncture of the thorax should always be made under antiseptic precautions, and special care should be taken that no air passes into it. In most cases a trocar of his own invention has been employed with a most satisfactory result. As much as 3000 grammes (100 ounces) of liquid have been evacuated without inducing hæmorrhage or rupture of the pleura, which accidents are liable to occur in the use of aspirators. The quantity of liquid drawn was always determined by the physical condition of the patient, and the process was stopped when abnormal action of the heart occurred, or there was disturbance of the lungs. But the quantity drawn usually ranged between 400 and 3000 grammes (13 and 100 ounces). Exudations in the left pleural cavity require more caution than those of the right, mostly on account of the complications of the pericardium and the larger vessels in extensive accumulations.

When purulent exudations were treated by puncture, it was invariably observed that phlegmonous inflammation occurred at the opening, even though all antiseptic precautions were adopted. He has rarely met with hæmorrhage from puncture, and yet in one case where a hæmatothorax was punctured there was degeneration, requiring incision, when the patient recovered. In cases of exudation of pus into the pleural cavity, incision, with or without the resection of a rib, is generally practiced by surgeons. The fear of the entrance of air, the author thinks, is not well founded, and considers that its effectual avoidance is almost impossible.

The question as to washing out the cavity of the thorax

immediately after the operation, and after every change of the dressing, is resolved by limiting irrigation to those cases in which the pus is decomposed and of bad odor. In such cases the operation is followed by irrigation with a solution of 1-per-cent. salicylic acid, 2-per-cent. carbolic acid, 2-per-cent. boric acid, or 0.02-per-cent. bichloride of mercury. In young subjects he employs an emulsion of iodoform and glycerin, or sometimes iodoform powder is blown into the cavity. This is afterward discharged by further irrigation or ejected by paroxysms of coughing.

The author summarizes the chief diseases of the thorax requiring surgical interference as the serous and purulent exudations of the pleura, with or without pneumothorax; more rarely, bloody effusions into the thoracic cavity caused by injuries; and, less frequently, abscess of the lungs, necrotic destruction of the bronchi and the lungs, tubercular cavities, foreign bodies in the thorax, echinococci, and neoplasms.

SURGERY OF THE ABDOMEN.

By J. EWING MEARS, M.D.,

PHILADELPHIA.

L. A. Stimson¹⁰⁸⁷_{v.7} discussed, in a paper presented to the American Surgical Association, the advantages and disadvantages of the *ligature en masse* in controlling hæmorrhage in abdominal operations. The advantages, the author states, which, in theory at least, belong to this method are celerity of performance and freedom from hæmorrhage, and it is not to be denied that in many cases these advantages do exist, especially in those where a narrow pedicle is to be ligatured. The principal objections to the *ligature en masse* are, first, that it is not always an efficient protection against hæmorrhage, and, second, that the mass of tissue embraced by it and forming the stump is sometimes so large, or so related, that it cannot safely be returned within the cavity and treated intra-peritonically. Ligatures left within the cavity embrace usually a broad layer of parietal peritoneum that has been drawn in from all sides toward the ligature, and is retained by it under considerable tension. Within this puckered fold of peritoneum lie the vessels and the tissue in which they are imbedded, all tense because they have been lifted up and drawn upon in the application of the ligature, and all constantly solicited by this tension to slip out of the loop. Each slight yielding to this traction makes the next one easier, for it diminishes the amount of tissue embraced within the loop, and thus diminishes also the friction by which the rest are retained. Hæmorrhage from such a ligature is not uncommon, and has been fatal, and the post-mortem examination plainly shows the mechanism by which it has been made possible: there is the large, circular gap in the peritoneum, the wide extravasation in the subperitoneal connective tissue, and far up within it the divided vessel, all indicating by their separation the traction necessary to bring them within the loop of a single ligature. The ligature has not simply to compress the vessels contained within it, but it has also to oppose a constantly-exerted everting strain, acting toward all

sides, widening its loop, and favoring the escape of the central vessels by loosening the friction upon them, and in this contest it has too often proved the weaker. The author thinks that the supposed necessity of tying all divided tissues in order that all hæmorrhage may be prevented is the consideration which has had most to do with the general use of this dangerous form of ligature. This necessity he does not think exists, and this mode of ligature should be abandoned, except in certain special cases, for that which is the rule in operations upon other parts of the body, viz., the ligature of the arteries alone with the smallest possible amount of additional tissue, and every effort should be made to exclude the peritoneum itself from the grasp of the ligature.

While I accept fully the views presented by Stimson with regard to the danger and disadvantages of the *ligature en masse*, I do not believe that surgeons employ this method in the manner described; that is, within the loop of a single ligature. This would be, indeed, a very dangerous method, and would be open to all of the objections urged by the author. The mass of tissue to be ligatured, if large or tense, should be tied in sections and encircled finally by the ligature. This not only condenses the mass, but also relieves the tension by drawing equally upon all portions. The dangers of intra-peritoneal hæmorrhage cannot be overestimated, and a necessity does exist for the ligature of all bleeding points. Ligature in section and then *en masse* is the only method which can be employed safely, for instance, in excision of the protruded omentum in herniæ.

TYMPANITES.

The subject of puncture of the abdomen for excessive tympanites was presented in the ANNUAL of last year, and, while opposed by one author on the grounds of danger from fæcal extravasations, was strongly advocated by other writers, who claimed that the danger of inducing or diffusing peritonitis by the traumatism of the operation was so infinitely small that its consideration should not weigh when the operation was indicated. Since these reports John W. Ogle, of London, ^{1088: 9} _{P. 66}, has published a valuable historical and clinical monograph upon the subject. The author states that puncture will effectively relieve distention of the colon and stomach, and some cases of small-intestine inflation, if

the calibre of the latter is greatly enlarged; the numerous kinks and twists in the small bowel will usually render the operation unavailing if this distention is not great. Puncture of the stomach should be resorted to only when obstruction of the œsophagus prevents relief by the tube. Aspiration of the intestines facilitates spontaneous reduction in curable cases of bowel obstruction by relieving the distended bowel and the impeded heart and lungs. Incurable cases are robbed of their most distressing symptoms by tapping. When distention is relieved, drugs which were before unabsorbed and powerless will often be taken up and begin to act copiously upon the intestines. The operation should be performed under strict antiseptic precautions, the surface of the abdomen being scrupulously cleansed by the use of soap and antiseptics. The trocar should be the very smallest available, and not triangular or spear-pointed, but round, that blood-vessels shall not be wounded, and that the intestinal mucous membrane shall most effectively close the opening in the bowel thereby made. When the gas has escaped a little water is injected through the trocar to cleanse it, and it is then withdrawn by a quick motion. The abdominal wound should be immediately sealed with a dressing of iodoform and collodion. Several or many punctures at various points may be made to accomplish entire relief, and repetition of the operation may be required to remove re-accumulations, due either to formation of more gas in the colon or its passage from the small intestine. The instrument should be cleansed by boiling before using it a second time. The study of the large collection of cases shows that extravasation after puncture practically never occurs; adhesions do not form, and subsequent operations are not rendered more dangerous. J. Jenkyns²_{Apr. 27} and W. L'H. Blenkarne²_{Mar. 9} each report a case in which puncture of the large intestine relieved promptly the urgent symptoms caused by the distention of the abdomen. Wm. Oxley⁶_{May 25} advises placing the patient in the knee-elbow position to promote the escape of the intestinal gas before resorting to intestinal puncture. He reports a case in which this procedure was instantly successful.

CHYLOUS CYST OF THE MESENTERY.

At the meeting of the American Medical Association, June 25th to 29th, N. B. Carson⁹_{July 12} reported a case of chylous cyst of the

mesentery in a male patient, aged 39, in whom he performed laparotomy. The tumor occupied a position midway between the umbilicus and pubes in the median line, and was the size of a foetal head. An exploratory puncture withdrew several ounces of milky-white fluid, and the diagnosis of "cyst of receptaculum chyli" was made. For a period of three months succeeding the aspiration the cyst did not refill. About two and a half years subsequently he saw the patient, and found that the tumor had increased very much in size, and had, of late, given the patient much annoyance. At the time when laparotomy was performed 5 pounds of fluid were withdrawn, which showed a specific gravity of 1014, reaction alkaline; also albumen, large granular cells with fatty protoplasm, minute fat-granules resembling those of milk, and crystals of chloride of sodium in great numbers. The walls of the cyst were hard, rough, and free from inflammation. The author stated that the case was the only one found in American literature, and, up to the present time, the largest cyst of the character on record. He reviewed the pathology of the disease, and advised extirpation as soon as it begins to interfere with the movements of the patient or to injure his health. Most cases can be relieved by incision and removal of the contents of the cyst.

CYST OF THE MESENTERY.

Delagenière, ⁷/_{No. 21} hospital interne, presented to the Anatomical Society of Paris, specimens of a tumor of the mesentery removed from a patient by Guyon. The patient, a woman aged 45, was admitted to the hospital suffering from epilepsy, and was not aware of the presence of the tumor, which was as large as a foetal head and occupied the left hypochondriac and lumbar regions, not descending into the pelvis. It was of a firm consistence and very movable transversely; slightly movable in the vertical direction and from before backward. Percussion showed that the intestines lay in front of the tumor. The urinary and genital organs were normal. The tumor increased in size, and the patient complained of abdominal pains to such an extent that Guyon decided to aspirate, evacuating 950 grammes (32 ounces) of brownish fluid, analysis of which gave albumen, urea, phosphates, and chlorides. After the aspiration the patient was free from pain and her general condition good. In two weeks the tumor attained the size it had

before the tapping; the patient suffered great pain and lost strength. Guyon decided upon an operation, and opened the abdominal cavity in the linea alba, between the xiphoid cartilage and umbilicus, when the cyst came into view, surrounded, apparently, by the peritoneum. Its origin was difficult to decide clearly. Puncture with the aspirator evacuated 800 grammes (28 ounces) of fluid analogous to that withdrawn at the first tapping. On examination it seemed to take origin in the mesocolon; it was separated with difficulty, after having tied a great number of large vessels which had a radiating arrangement. One vein was as large as the thumb. The pedicle was returned to the cavity of the abdomen after a careful disinfection. A large collection of glands were not disturbed. The patient died on the seventh day following the operation.

CYST OF THE OMENTUM.

John Waldy⁶_{Sept. 23} reports a suppurating cyst of the omentum, which was removed successfully from a girl 8 years of age. During the two years previous the patient had suffered at intervals from attacks of abdominal pain, which had increased in severity and frequency, unaccompanied by vomiting, and not apparently caused by food or violent exercise. On examination the abdomen was found to be enlarged, measuring about 24 inches in circumference at the umbilicus. On palpation a tense, globular, hard, freely-movable tumor, superficially placed, could be felt—fluctuation distinct in all directions. It did not occupy the pelvic or lumbar regions. A diagnosis of either suppurating hydatid or dermoid cyst was made, and excision or drainage advised as the only chance of relief. The abdomen was opened by an incision between the umbilicus and pubes in the median line, and adhesions were found fastening the cyst in front to the abdominal wall; these were separated and the cyst was partially emptied and drawn out of the cavity, when adhesions to the liver and intestines were revealed. The cyst was now entirely evacuated and an effort made to separate the intestinal adhesions, in accomplishing which the descending colon, to which the cyst was very firmly adherent, was lacerated, and the small opening made was immediately closed by Lembert sutures. The broad pedicle formed by the adherent omentum was ligatured in sections by catgut, the abdominal cavity washed out, a drainage-tube introduced, and the wound closed and dressed with

iodoform wool. The patient convalesced promptly. The free mobility of the tumor, with the ability to pass the hand between the liver and spleen and the swelling, and into the pelvis and lumbar regions, excluded a tumor originating in any of the abdominal or pelvic organs. The age of the patient suggested a dermoid cyst. The cyst was unilocular, its size about that of a large foot-ball, walls $\frac{1}{8}$ inch thick, and to its inner surface three plates of bone were adherent. Microscopic examination of the fluid revealed pus only.

RETROPERITONEAL FATTY TUMOR.

H. H. Mudd⁸²_{July 6} describes a large fatty tumor, which was retroperitoneal in origin, an attempt to remove it being abandoned after an exploratory incision had been made. The patient, a married woman aged 71 years, had suffered for nine years from the presence of an abdominal tumor. An examination revealed the abdomen protruding forward and pendent, resting on the thighs when the patient is in a sitting posture, lateral protrusion slight; percussion sound dull and fluctuation apparently distinct; ascites believed to be present; nodules outlined in the tumor. Measurement from sternum to pubes, 28 inches; from sternum to umbilicus, 20 inches; circumference of abdomen at loins, 59 inches. Two months later the emaciation of patient was marked. Œdema of legs and lower part of abdominal walls very great. Circumference of abdomen at loins, 66 inches. No evidence of involvement of uterus, which is small, mobile, and free. An operation of exploration was made, which discovered a large retroperitoneal tumor, non-removable, and the incision was closed. On the fifth day following this operation the patient died of œdema of the lungs and exhaustion. Post-mortem examination revealed the presence of a large fibro-lipoma, which filled the abdominal cavity, springing from the posterior wall, adherent throughout the right lateral region from the liver to the brim of the pelvis and to the median line from the celiac axis to the sacrum, and also to the upper portion of the left abdominal wall, its firmest attachment being along the spine. The pyloric end of the stomach, the duodenum, and the pancreas were imbedded in the mass. The spleen was lifted forward with the pancreas, and was adherent to the tumor. The small intestine and the colon were pushed over to the left side posteriorly and

occupied the lower part of the peritoneal cavity. The lower end of the ileum was imbedded in the anterior portion of the tumor; both kidneys were displaced, the right being carried downward and forward fully 12 inches; the left was deeply imbedded in the substance of the tumor. The bladder, uterus, and broad ligaments were free. There was no ascitic fluid. The tumor weighed 63 pounds. The author cites several authorities showing the rarity of this form of tumor.

SUPPURATING HYDATID CYST OF THE ABDOMEN.

J. M. Girdlestone²⁸⁵_{Dec., '98} reports a case of suppurating hydatid cyst of the abdomen cured by incision and drainage. The patient, a woman aged 30 years, had noticed a swelling in her abdomen nine months before, which had gradually increased in size, and which had been tapped five times prior to the operation of incision. A clear, watery fluid was withdrawn. In order to secure the cyst in position, three long acupressure pins were introduced, parallel to each other and $\frac{3}{4}$ inch apart, deeply through the abdominal wall, anterior portion of the tumor, and then brought out on the opposite side through the skin. A silk ligature in figure-of-8 form was applied over the pins. On the day following the introduction of the pins the central one was removed and the abdomen opened by an incision 2 inches long, made between the pins remaining in position. The cyst-wall was incised, and the cut edges were sutured to the margins of the abdominal wound. Rather more than a pint measure of purulent fluid and daughter-cysts were evacuated; a large rubber drain-tube was inserted, the cyst washed out with a 1 to 1000 perchloride-of-mercury solution, and the wound covered with layers of perchloride gauze, over which iodoform had been freely dusted. The two remaining acupressure pins were removed. The recovery of the patient was uninterrupted; the sutures which fastened the cut edges of the cyst to the abdominal wound were removed in a week; the discharge gradually ceased and the wound closed. A month after leaving the hospital she was safely delivered of a child.

The writer of the paper calls attention to the necessity of securing the hydatid cyst to the abdominal wall, in order to prevent escape of the contents into the abdominal cavity, especially in suppurating cysts.

SUBPHRENIC HYDATID CYST.

Karl Lobker⁶⁹_{May 1} reported at the meeting of Greifswalder Medical Society a case of subphrenic hydatid cyst, for the relief of which laparotomy was performed successfully in the presence of a general peritonitis. The patient, a married woman aged 33, gave the history of pains in the right hypochondriac region for a number of years; at times marked jaundice was present. When examined by the author there were symptoms of general peritonitis with great prostration; the abdomen was tender and the right hypochondrium and epigastrium were distended by a swelling which extended downward to the line of the umbilicus. Percussion dullness extended upward to the fourth rib on the right side and on the left side; the cardiac dullness was continuous with that of the tumor; the heart was displaced to the left side. Distinct fluctuation was present over a small area in the epigastrium between the ensiform cartilage and the left border of the ribs. A diagnosis of suppurating subphrenic hydatid cyst was made. By aspiration a small quantity of yellowish pus was evacuated containing detritus, but no hooklets. Notwithstanding the presence of peritonitis, laparotomy was decided upon, and an incision 10 centimetres (4 inches) in length was made downward, beginning at the highest point in the epigastric region and to the left of the ensiform cartilage. A large quantity of cloudy serous fluid escaped on opening the abdominal cavity. The cut edges of the peritoneum were sutured to those of the abdominal wound, and the left lobe of the liver was sutured to the margins of the abdominal wound so as to shut off the peritoneal cavity. A cannula was introduced, but drew off only a small quantity of pus, and the opening was enlarged by an incision, by means of which about 2 litres of purulent fluid, containing numerous vesicles and a large portion of the parent-cyst in necrotic pieces, were evacuated. The cyst occupied the entire space between the diaphragm and liver, extending upward on the right side to the fourth rib. Irrigation with a lukewarm solution of salicylic and boric acids was continued until the fluid returned clear. A drain-tube was not introduced, as the ribs, which had been forced upward, prevented closure of the opening. Severe shock followed the operation. On the day following improvement took place and the patient made a rapid and complete recovery.

SUBDIAPHRAGMATIC ABSCESS.

A. L. Mason⁹⁹_{Nov. 7} read before the Suffolk District Medical Society a paper on subdiaphragmatic abscess, recording 3 cases illustrative of some of the conditions and complications which accompany this form of abscess. The author stated that these abscesses, which are non-pyæmic and not trophical in origin, are of uncommon occurrence. They may find their starting-point in the perihepatic, perinephritic, or perisplenic region, and are usually due to injuries, to secondary inflammation from calculi, or perforating ulcers of the stomach and duodenum, or to cancer, syphilis, or tubercle. They are sufficiently rare and dangerous to be of great interest both to the physician and surgeon, and the difficulty of determining their precise seat is often insuperable owing to the distance of the pus from the surface, so that much time is usually lost in forming a correct opinion. If the patient is not seen until the thoracic or lower abdominal cavity is invaded, as is often the case with those who appear in hospitals, the secondary pneumonia, pulmonary abscess, pleurisy, empyema, intestinal inflammation, or peritonitis may still further obscure the diagnosis. When the position of the abscess is determined, free incision must be made and drainage must be accomplished.

PERITONITIS.

The surgical treatment of peritonitis was discussed at length in the French Surgical Congress,¹⁴_{Oct. 13} held October 7th to 13th. Demons thought no one would deny that the surgical treatment of peritonitis was a difficult question to solve; there were a number of varieties. Tardy intervention was responsible, in a great measure, for the want of success. One should not hesitate; laparotomy is the only hope of safety, and this he had observed on several occasions. In 1883 he had under care a woman suffering from purulent peritonitis following suppuration of an ovarian cyst. Her condition was desperate, but he did not hesitate to perform laparotomy, evacuate the pus, remove the cyst, and, with a rough sponge and blade of a knife, scrape the entire surface of the intestine; a most satisfactory recovery followed. In this case he was not content with simple washing out; he felt it proper to scrape the inflamed portions, as more efficacious and affording less risk of

missing portions of the exudates; and, as a consequence, he put the affected parts in the best condition for recovery. In a similar case he assisted Denucé in performing this radical method of cleansing, and the patient rapidly recovered. This method he regarded as superior to irrigation with hot water, which often was but a palliative measure. He considered that laparotomy gave better results in tubercular peritonitis than in the ordinary form, and recalled 2 cases in which, through mistaken diagnosis, he had opened the abdomen. In both cases he applied iodoform to the surfaces. One patient was much benefited and the other has been well for fifteen months. The results he attributed to the laparotomy and not to the iodoform, which was applied as a matter of form. Bouilly communicated 12 cases of acute peritonitis, which he had treated by laparotomy. In 1 case of traumatic peritonitis, caused by a kick of a horse upon the abdomen, producing rupture of the intestine, he performed laparotomy twenty-eight hours after the injury; resected 10 centimetres (4 inches) of the intestine and sutured the two ends; peritonitis cured, with formation of an artificial anus. One case of peritonitis accompanying extra-uterine pregnancy: laparotomy about the eighth day; cure; expulsion by the anus of two decomposed fœtuses. Suppurative salpingitis caused peritonitis in 1 case in which laparotomy was performed two and a half months after the initial disease; death from phthisis eight months after. One case of perforative peritonitis following appendicitis was cured by laparotomy fifteen days after its appearance. Immediate death followed in 1 case of laparotomy on the fifth day for peritonitis caused by torsion, with gangrene of the omentum. In 6 cases of puerperal peritonitis, laparotomy was followed by 4 deaths and 2 recoveries. The same details were carried out in all of the operations: washing out of the cavity by hot water or solution of corrosive sublimate, 1 to 4000, 10, 12, and 15 litres (10, 12, and 15 quarts) being used; drainage, with suture of the abdominal walls and antiseptic dressing, completed the operations. In the 12 cases 6 recoveries occurred. It is but proper to remark that the cases were desperate. Notwithstanding the want of complete success, Bouilly thought it right to persevere in this line of treatment. Léon Labbé, Campenon, Routier, Denucé, and Brun recounted their experiences in the treatment of peritonitis by laparotomy, showing favorable results.

TUBERCULAR PERITONITIS.

F. Spaeth^{69 96}_{No. 20; Aug.} discusses the operative treatment after tubercular peritonitis, reporting 4 cases which had been treated in Prochownick's clinic by laparotomy. In all of the cases the inguinal glands on both sides were considerably enlarged, and in every case the tubercle bacilli were found. This is important, for many cases of chronic disease of the peritoneum which at first sight appear to be tubercular are found on microscopic examination to be nothing more than a peritonitis with a nodular formation,—a simple lymphoma of the peritoneum. So far, little attention has been paid to the demonstration of tubercle bacilli in the excised pieces. In 41 of Kümmel's cases the results of the microscopical examination are only mentioned in 11 cases, and in only 5 of these were bacilli reported present. Of the 4 cases reported by Spaeth 1 died of collapse in five days after the operation, to which condition a marked atrophy of the kidney contributed in a large degree; the second died of acute phthisis three months after operation, the third of intestinal tuberculosis, and the fourth of the same disease. The unfavorable results could not be attributed to the operation. The following conclusions are presented: 1. In primary tuberculosis of the peritoneum, without implication of other organs, laparotomy may act as a curative agent and is to be advised. 2. In tuberculosis of the peritoneum, where the female genitals are involved in the process, the operative treatment has not given any satisfactory results. 3. In tuberculosis of the peritoneum due to a tubercular enteritis, the operative treatment is only palliative. 4. In genital tuberculosis, unaccompanied by peritoneal tuberculosis, early radical operation is to be urged. The indications for operation are not readily determined owing to the impossibility of making a bacteriological diagnosis before laparotomy. 5. Primary tubercular peritonitis is a much rarer form of disease than has heretofore been thought. Hence, care should be exercised in making a diagnosis, and a bacteriological examination of every case should be made.

STOMACH AND INTESTINAL TRACT.

GASTROSTOMY.

W. B. Rogers⁹⁶_{Feb.} records a successful case of gastrostomy performed upon a patient, aged 24, who was suffering from cicatricial

stenosis of the œsophagus as the result of the ingestion of concentrated lye. Repeated efforts having failed to dilate the structure to such extent as to afford permanent relief, gastrostomy was advised and acceded to. The abdomen was opened by an incision parallel with and 1 inch from the left costal border. Two fingers were introduced; the stomach was grasped and brought into the upper end of the abdominal opening. Having selected a point of attachment with least tension, two long harelip pins were passed through the serous and muscular coats parallel with each other, $\frac{1}{2}$ inch apart and transverse to the abdominal wound, on the edges of which their ends rested. The stomach was sutured to the edges of abdominal incision by the plan suggested by Greig Smith, a straight, flat needle $1\frac{1}{4}$ inches in length, armed with plaited silk and devoid of cutting edges, being introduced beneath the serous and muscular coats of the stomach, and made to encircle a space $1\frac{1}{2}$ inches in diameter, inclosing the pins already placed. The needle was brought out and re-entered at intervals of $\frac{3}{4}$ inch, each time leaving a loop of thread protruding. The circuit having been completed, five loops and a tie presented; by means of a large, rounded needle, armed with double thread, these loops were successively brought directly through the abdominal wall at proper points. A rubber tube was then passed through each of the loops, which were one by one tightened, and lastly the tie was brought out and made around the tube. The lower end of the incision was closed by two sets of sutures, one for the peritoneum and one for the muscles and integument. On the fourth day the pins were removed, and on the eighth day the looped sutures and rubber tubes. On the tenth day an opening the size of a $\frac{1}{4}$ -inch drainage-tube was made into the stomach. Three days later all of the sutures were removed, and the patient was sitting up on the fourteenth day. A silver tube with shield was made, by which the gastric fistule was closed. The patient took nourishment through the œsophagus in small quantities, supplementing it when necessary by feeding through the gastric fistule. His health and strength became excellent.

Bayard Holmes²³¹_{Dec., '88} reports a case of supposed carcinoma at the junction of the pharynx and œsophagus in which gastrostomy was performed. The patient became greatly emaciated, bloodless, and extremely weak as the disease progressed, and finally there

was a complete obstruction presented, preventing passage of even the smallest bougies. Gastrostomy was performed by an incision $1\frac{1}{2}$ inches in length, made parallel with the left costal cartilages and 1 inch from them. On opening the abdominal cavity two fingers were introduced, and some difficulty was experienced in seizing the stomach. After enlarging the incision the pyloric end of the stomach was brought into view and the greater curvature recognized by the coronal artery and omentum. The organ was so much atrophied that it measured scarcely $\frac{1}{2}$ inches in length. The peritoneum having been sutured to the fascia, the stomach was fastened in place by twenty strong interrupted sutures, exposing a surface 1 inch by $\frac{1}{2}$ inch. This portion was covered by iodoform gauze after the remaining portion of the incision had been closed and the wound was dressed. On the day following an opening was made into the stomach, the mucous membrane drawn out and sutured to the edges of the wound, and a tube 8 millimetres ($\frac{3}{8}$ inch) introduced, through which the patient was fed. The capacity of the stomach, which at the beginning was only about 4 ounces, increased rapidly until nearly a quart was necessary to satisfy the patient. Milk-punch, eggnog, beef-tea, and a liberal quantity of champagne and other stimulants were given, at intervals of two hours, in such quantities as the capacity of the organ would admit. Notwithstanding the great relief and satisfaction experienced by the patient from feeding he gradually lost strength, and died at the end of the fifth day. No autopsy was made.

F. J. Lutz⁸²_{June 29} exhibited at the meeting of the Missouri State Medical Association, May, a patient of M. F. Porter, upon whom gastrostomy had been performed December 4, 1887, the case being reported in the last ANNUAL. Attention was called to the best plan of keeping the fistule closed by means of a snugly-fitting rubber tube, continuously worn, and to the great importance of thoroughly insalivating the food prior to its introduction into the stomach through the fistule. He also presented the specimens from a patient suffering from stenosis of the œsophagus caused by malignant disease, upon whom he performed gastrostomy in one stage, the patient living for ten weeks after the operation, with satisfactory nourishment and amelioration of his symptoms.

J. C. Clark¹_{Nov. 2} reports a successful case of gastrostomy, in a girl aged 20, for cicatricial stenosis of the œsophagus caused by the

ingestion of strong washing-fluid. Feeding was accomplished through a silver tube, $\frac{1}{8}$ inch in diameter, 2 inches long, with a flange $\frac{1}{2}$ inch from the outer end—straight, except at inner end, where it makes a slight curve. A soft, flexible rubber tube, with a calibre of $\frac{1}{2}$ inch, was connected to the silver tube, a hard-rubber mouth-piece being fitted to the outer end. The silver tube was kept in place by a tape made of elastic webbing. After eating, the rubber tube is doubled up, tied, and put in a pocket provided for that purpose upon the inside of the dress. At night the rubber tube is removed and the silver tube corked up. In one month and a half the patient gained 25 pounds in weight.

B. E. Hadra⁸⁵_{Sept.} reports a case of carcinoma of the lower portion of the œsophagus in which the duodenum was opened, at the time of operation, instead of the stomach, the patient dying from exhaustion in two days after the operation.

D. N. Knox²¹³_{Aug.} and J. J. Weaver, for Arthur Jones,¹⁸⁷_{July} report successful cases of gastrostomy for œsophageal strictures, the patient of the former being alive at the time of report and that of the latter having lived thirteen weeks and four days after the operation.

The results obtained in the cases of gastrostomy reported, of which the current literature presents quite a large number, demonstrate, first, the necessity of early operative interference before the period of starvation has arrived and the vital powers of the patient exhausted; second, the advantage gained in performing the operation in two stages, the gastric fistula being made after complete fixation of the stomach to the abdominal walls; and, third, desirability of making the opening into the stomach as small as possible, so as to secure good adaptation of the tube and prevent regurgitation of the food, which, finally, should be insalivated before introduction.

GASTROTOMY.

Hashimoto,¹⁰¹_{June} Surgeon-General of the Japanese Army, records a case of gastrotomy upon a patient, a woman aged 49, who swallowed a tooth-brush during manipulation, which she had for years employed to induce vomiting by irritating the fauces. In May, 1872, the brush, an instrument of soft wood, having one end pointed and the other split in the form of bristles, and of the thickness of a pen-holder, was ingested. Fever and severe pain

in the epigastrium, which gradually lessened, followed. In March, 1873, the pain returned and an abscess formed in the epigastric region, which opened spontaneously and extruded the pointed end of the brush, which the physician, failing to extract the brush, cut off. Although the wound healed, a disagreeable sensation persisted, as of the presence of a foreign body. At the end of August, 1886, the pain and swelling returned and another abscess formed, which discharged at the umbilicus, leaving a fistulous tract. In October, 1888, the patient was admitted into the hospital with two fistulous openings in the umbilical region, at the bottom of one of which a foreign body was detected by the probe. On November 19th, under the influence of an anæsthetic, the wound was enlarged and the brush extracted with the forceps, colorless gas escaping with a sound at the time. The fistulous canal was enlarged in the upward direction until the wall of the stomach became visible, the tissues curetted, hæmorrhage arrested, the muscles united by three and the cutaneous structures by seven sutures, and the wound dressed antiseptically. Previous to the operation the discharges from the wound were alkaline, which became acid after the removal of the brush, showing that it had acted as a plug in the opening in the wall of the stomach. In five weeks the wound was healed and the patient in good health. The brush appeared carbonized, which was probably accomplished by the gastric juice. The author relates another case in which a patient, under exactly similar circumstances, swallowed a brush of the same size in September, 1879. Six days following the ingestion laparotomy was performed, and the brush, which had excited a perforative peritonitis, was extracted. The edges of the wound in the stomach were necrotic and were excised, and the opening then closed with Lembert sutures. Death followed three days later.

Le Dentu³ presented to the Academy of Medicine the report of a case of gastrotomy performed by him upon a patient, 21 years old, who had swallowed, the day preceding, a wooden kitchen-spoon. Between 2 and 5 o'clock in the morning, about twelve hours after the ingestion, he experienced severe pains and the sensations of a laceration in the region of the stomach. Two of his internes thought fully they had located the foreign body 2 fingers' breadth below the umbilicus and to the left of the linea

alba, but at the time of his examination it was not possible to know what position it occupied. The belly was contracted and firm over its entire extent. In order to avoid early perforation of the stomach by the long shank of the spoon, he decided to perform gastrotomy on the following day. There were no signs of peritonitis, and the patient had slight pain. On opening the stomach at the point of election he was astonished not to find the foreign body. Exploring the cavity of the abdomen, he found the spoon occupying a vertical position in the pelvis, one end resting on the bladder, the other lying behind the linea alba, extending from 3 to 4 centimetres above the umbilicus. The incision in the linea alba was extended from 9 to 10 centimetres, and with the forceps the conical end of the handle was seized and the entire spoon was extracted without difficulty, a small quantity of sero-sanguinolent, slightly fetid fluid following its extraction.

The only lesion recognized was a thickening of the omentum



Total length of spoon, 26.7 centimetres (about 10½ inches); handle, 23.4 centimetres; spoon-bowl, 3.3 centimetres.
(*La Semaine Médicale.*)

between the stomach and umbilicus of a dirty color, and its adhesion to the abdominal wall, which indicated the course followed by the foreign body in its passage from the stomach. A minute examination of the two surfaces of the stomach, the colon, and small intestine did not disclose any perforation, and it was inferred that closure had taken place. The wound of the stomach was closed by fourteen silk sutures, the organ replaced, and the abdominal incision closed by deep and superficial sutures. The operation lasted two hours and three quarters, including the time required to anaesthetize the patient. With the exception of a small abscess in the abdominal wound, the recovery was prompt and complete.

Le Dentu believes that the foreign body had been swallowed but forty-three hours before the operation, and that certain circumstances, and especially the ease with which the spoon was extracted, forbid the belief that it was introduced into the rectum and not into the stomach. He presented the following conclusions: 1. Perforation of the stomach and slipping of the spoon into the peritoneum had taken place twelve to fifteen hours after it had

been swallowed. 2. Perforation had occurred on the level of the greater curvature, and the spoon had passed between the two anterior layers of the omentum. This explains how the cicatrization was so rapid and so firm as to prevent the passage of alimentary substances. 3. The absence of pathogenic germs in the stomach, or their removal from the spoon as it slipped between the layers of the omentum, explain the absence of peritonitis following an accident of this character. 4. Experience possessed up to this day with regard to the action of foreign bodies in the stomach explains why it was sought for in the stomach. There was no evidence on record that perforation had ever taken place in so few hours.

Terrier³_{May 29} reported at the meeting of the Société de Chirurgie, May 22d, a case of gastrotomy for the removal of a fork swallowed by a young man. The point of interest to which attention was directed was the opening of the abdomen by the median incision between the ensiform cartilage and the umbilicus. This, he contended, was the best line of incision on account of absence of blood-vessels, the facility with which the left lobe of the liver is found, and beneath it the stomach. The fork was easily removed after section of the wall of the stomach. The gastric wound was closed by sutures of the mucous membrane, then of the muscular and serous coats. Twenty-five minutes was required for the operation and rapid recovery followed.

GASTROTOMY AND ENTEROTOMY.

Radestock¹²_{Sept.} publishes a report of a double operation of gastrotomy and enterotomy performed upon a young prisoner, who attempted suicide by swallowing a rubber cuff, five pieces of glass, each as broad as the finger, and ten pieces of wood, each as long as the finger and as thick as a thumb. On the twenty-third day after the attempt at suicide laparotomy was performed, the intestine opened, and a large part of the foreign bodies removed. Another incision in the abdominal wall was required to open the stomach and remove those that were felt in this organ. On the twenty-eighth day after the operation he was returned to prison, when he attempted to re-open the wounds and again swallowed some pieces of wood. Enterotomy was again performed, and three pieces of wood, each 4 inches long and as thick as a finger, were removed. In ten days cure was complete.

PYLORECTOMY.

Park ²⁵⁹_{Apr.} presented, at a meeting of the Buffalo Pathological Society, specimens from a case of resection of a cancerous pylorus. Patient (a young married woman) had been in good health until five years ago, when indefinite gastric symptoms appeared. Since last fall she had noticed a tumor in the epigastrium, which had grown steadily, though it was still very movable. During three weeks prior to examination everything ingested had been vomited, and the patient was excessively reduced. Cancer of the pylorus was easily recognized. After a few days' preliminary treatment, pylorectomy was performed, removing completely the cancerous pylorus, with a considerable portion of the greater curvature of the stomach,—altogether, about one-quarter of its entire extent. The operation lasted one hour and forty minutes. The patient progressed well for two days, when symptoms of exhaustion appeared, and she died in collapse sixty-three hours after the operation. Upon autopsy, the stomach was found to contain over a pint ($\frac{1}{2}$ litre) of altered blood, the hæmorrhage having evidently come from a minute vessel in the mucous membrane at the upper end of the incision. Every suture held perfectly. There was no leakage, nor was there any sign of peritonitis. Apparently the patient's death was caused by the hæmorrhage. The stenosis was so complete that a match was with difficulty passed through the opening.


Sir William Stokes ²_{July 6} performed the operation of pylorectomy in the Meath Hospital on a female patient, aged 48, suffering from cancer of the pylorus. The operation lasted over two hours. The patient rallied fairly well, but became subsequently very weak, and died twelve hours after the operation. This operation of pylorectomy is reported as the third which has been performed in the United Kingdom, Southam's and McArdle's having been the first and second. The case of Buchanan's, in the Glasgow Infirmary, reported in the last ANNUAL, should be added to the list.

F. Ortmann ⁶⁹_{Feb. 23} records a successful operation of pylorectomy by Mikulicz for a non-malignant cicatricial ulcer of the pylorus in a woman aged 40 years. Ten weeks before admission into the hospital patient complained of a localized pain in the right side of the abdomen, noticed a hard tumor in the painful region, and sustained a rapid loss of flesh. On examination, a hard, sausage-shaped tumor, about 10 centimetres (4 inches) long, was detected a

little above and to the right of the umbilicus, movable and painful. Distention of stomach showed great dilatation, also that the tumor was connected with it and occupied the position of the pylorus. Examination of contents of stomach revealed sarcinae and bacteria; free hydrochloric acid absent, as shown by phloro-glucin vaseline-solution test. Resection of the pylorus was performed by Rydygier's method, removing 9 centimetres ($3\frac{1}{2}$ inches) along the greater curvature and 7 centimetres ($2\frac{3}{4}$ inches) along the lesser. Microscopical examination showed the ulcer to be non-carcinomatous in character. Recovery took place promptly, and in one month the patient left the hospital. Six months later she was in perfect health, having increased in flesh, and was able to eat and digest food of all kinds without pain or inconvenience.

PYLOROPLASTY.

Ortmann⁶⁹_{Feb. 28} describes a successful operation of pyloroplasty, performed by Mikulicz, for the relief of cicatricial stenosis of the pylorus. The patient, female aged 23, had suffered from stomach symptoms for six years, at which time she had swallowed a teaspoonful of concentrated sulphuric acid. Severe gastric pains, with vomiting of blood and inability to swallow solids, followed. The daily passage of bougies for four months dilated the œsophagus and permitted the ingestion of solid food. Pain and vomiting occurred, however, after each meal. Daily washing out of the stomach was practiced for the last three years. Examinations showed œsophagus of normal calibre; abdomen normal. On distention the stomach was found much dilated; free hydrochloric acid found in contents. On June 25, 1888, the operation of pyloroplasty was performed, the abdomen being opened by an incision, 10 centimetres (4 inches) long, in the linea alba above the umbilicus. On introducing a finger, the pylorus was found free from adhesions, and was drawn as far as possible forward. An incision was made in the stomach, through which the finger was passed into the pyloric orifice, which was found closed by a ring-like stricture, rendering the opening so narrow that the tip of the little finger could not pass through. The incision was continued in the long axis of the stomach up to the point of stricture, and then through it into the duodenum, dividing a strong, circular, valve-like cicatrix of the mucous membrane. The thickening was

confined to this coat. The wound was closed by three rows of silk sutures in such a manner that the longitudinal incision became transverse in the pyloric region, with a small portion toward the cardia, united longitudinally, giving to the wound, when closed, a  shape. The abdominal incision was closed by wire and continuous catgut sutures. Prompt recovery followed, and six months later the patient was well, increased in weight, and was free from vomiting. This operation makes the fourth which has been done, with but one death. The first was by Heinecke in 1886; second, by Mikulicz, in 1887, fatal; third, by Bardeleben, in 1888; fourth, by Mikulicz. The results have been most favorable in the successful cases.

Lauenstein ⁵⁰_{Aug. 10} read a paper before the Eighth German Congress of Internal Medicine, April 15th to 18th, on stricture of the pylorus, in which he presented his views based upon a study of 20 cases: 11 of carcinoma, 7 of cicatrices, 1 of duodenal stricture, and 1 of compression of the pylorus by a large gall-stone. With regard to diagnosis, he called attention to the position of the pyloric tumor when the stomach is of moderate size, empty, and markedly distended. In the first instance it is in the epigastric region, at the level of the eighth or ninth costal cartilage; in the second instance it lies a little more to the left; and in the third instance it moves to the right. Cicatricial masses lie somewhat deeper, as a rule, than cancer, and frequently form adhesions with the mesocolon or transverse colon. Of the three operations which may be performed for the relief of pyloric stricture, pyloroplasty is of service in cicatricial stenosis, gastro-enterostomy in inoperable cases of carcinomatous or ulcerative stenosis, and pylorectomy in cases of non-adherent carcinoma.

In discussing the question of diagnosis in tumors of the pylorus, at the Eighteenth Congress of the German Surgical Society, Angerer, ⁸¹_{No. 18} in a study of 16 cases in which he had operated for carcinoma and stenosis, derived much benefit from Ziemssen's method of distending the stomach by introducing bicarbonate of soda and tartaric acid. By this method two important points may be determined: first, the exact limits of the stomach can be defined and the seat of the tumor determined; second, the mobility of the tumor and the presence of adhesions can be, to a certain extent, ascertained. The boundaries of the growth

should be mapped out with a pencil before and after the introduction of the gas. Under normal conditions the pylorus is constantly displaced downward and to the right. Deviations from this rule afford data regarding pathological conditions present. Movement of a growth with the movements of the liver and diaphragm indicates intimate adhesion to these organs, and should be a contra-indication to resection of the pylorus. Adhesions to the pancreas are most difficult of recognition. Experimental ligation of the pylorus and fixation to the head of the pancreas in the cadaver showed, after distention of the stomach, a peculiar flexion of the stomach in front of the ligated pylorus. Hence, it is inferred that if the tumor becomes smaller or disappears after distention it is probably connected with the posterior wall of the stomach, and, if fixed, it may be assumed that it is adherent to the pancreas. Of 6 typical pyloric resections but 1 survived, and this patient suffered from cicatricial stenosis. The remaining died at short intervals after the operation, 2 living three weeks. Of 6 cases of gastro-enterostomy, 1 was living at the time of the report, two months after operation, much improved; 1 in whom the ileum, by mistake for the jejunum, was sutured to the stomach, died in three weeks; and the others died in the first week. In discussing the paper, Lauenstein stated he thought it impossible to differentiate malignant and benign tumors before operation, although the presence of cachexia was of some importance in the diagnosis. Irrigation of the stomach, he believed, had lessened the danger of collapse in some cases. Silk should not be used for continuous suture in cases of gastro-enterostomy and pylorotomy. In 9 cases of the former, 2 died shortly after operation and 7 lived from six to eight months. Of 9 of the latter, 5 survived only a short time.

DIGITAL DIVULSION IN CARDIAC AND PYLORIC STRICTURE.

Loreta,²_{Apr. 20} on March 17th, performed successfully mechanical dilatation of both orifices of the stomach, at one sitting, in a patient aged 48, who had suffered since he was 15 from functional disease of the stomach. The symptoms present at the time of examination were regurgitation, oppression, and acid eructation. The œsophageal bougie was arrested at a point 41 centimetres (16 inches) from the incisor teeth. An operation for the purpose of relieving the cardiac stenosis was performed by Loreta, who

opened the abdomen by an incision 10 centimetres (4 inches) in length in the linea alba above the umbilicus, and drew a portion of the stomach out, which was covered with flannel wrung out of a solution of corrosive sublimate at a temperature of 45° C. (113° F.). An incision 6 centimetres ($2\frac{1}{3}$ inches) in length was then made in the stomach, hæmorrhage being prevented by forcipressure forceps. Having failed to pass a dilator from the stomach through the stricture, which was a short distance above the cardiac orifice, a bougie was passed through the mouth into the œsophagus, and forced through the stricture. The dilator was now introduced through the stomach into the stricture, guided by the bougie, and dilatation performed. The pylorus, which was found to be contracted, was next dilated by digital divulsion, and the wounds in the stomach and abdomen closed. On the eleventh day the patient was progressing satisfactorily.

Frederick Treves²_{MAY 18} reports in detail a case of successful dilatation of a pyloric stricture by digital divulsion which he had performed, and calls attention to the fact that the successful case of Hagyard, performed March 6, 1886, was the only one recorded in Great Britain. In commenting upon the very favorable result achieved in this case he says, "a more admirable result modern abdominal surgery could scarcely claim." In his case the patient had suffered from gastric disorder for a number of years, induced, it was thought, by a kick from a horse over the epigastric region. At the time of operation he was very much reduced in flesh and strength, having latterly been nourished by nutrient enemata. The abdomen was opened by an incision 4 inches in length in the linea alba, reaching to the umbilicus. The pylorus was found with difficulty, imbedded in a mass of almost cartilaginous hardness, which, with a portion of the stomach itself to the extent of 3 inches, was adherent to the liver. It was found impossible to separate the pylorus and stomach entirely from their attachment to the liver. The stomach was opened by a vertical incision midway between the two curvatures, and about 2 inches from the pyloric orifice. To avoid hæmorrhage Treves thinks the incision should be vertical and not too near the pylorus, and scarcely large enough to admit the index finger, with which it is at once plugged. When the finger had been passed through the pylorus into the duodenum by a boring process the incision was slightly enlarged,

the finger being kept in place, and the middle finger was introduced and passed through the orifice, the index finger being inserted slowly after it. The dilatation of the orifices to the extent of admitting the two fingers was thought to be sufficient, as this would have a circumference of 4 inches. Loreta is reported to dilate the pylorus until the fingers are more than 3 inches apart; this would represent an opening with a circumference of not less than 7 inches. In this case rupture of the walls of the stomach would have occurred if dilatation to this extent had been attempted. The gastric incision was closed by continuous silk suture through mucous and muscular coats and Lembert sutures through the serous coat. Abdominal wound closed by deep, interrupted sutures, dressed with a sponge, dusted with iodoform, and held in position by a tightly-applied flannel binder. Notwithstanding the most insubordinate conduct on the part of the patient, which caused a re-opening of the abdominal wound, which had been healed by first intention, he recovered promptly, and when seen three months later complained only of poverty. Treves believes the operation to be of very limited application owing to the rarity of examples of non-cancerous stenosis of the pylorus. As it has been performed with astonishing frequency on the Continent, it would be interesting to know the precise pathological condition found to be associated with these operations. The specimens in the various museums of London throw little light upon the fibrous stricture of the pylorus, of which so frequent mention is made in Continental literature.

Barton¹⁰⁸⁷_{v.7} read a paper at the meeting of the American Surgical Association on "Digital Divulsion of the Pylorus for Cicatricial Stenosis," in which he reported 2 cases of the operation—1 of which was successful and 1 fatal—and reviewed the results in 25 collected cases; of the 25 cases there were 15 recoveries and 10 deaths, giving a mortality of 40 per cent.

Kinnicutt and Bull⁵⁹_{June 8} report a successful case of digital divulsion for cicatricial stenosis, and present the results of 20 cases—excluding 2 cases, 1 of carcinoma and 1 because reported on the sixth day; 18 cases give 12 recoveries and 6 deaths, a mortality of 33.3 per cent. The causes of death were gastric hæmorrhage, renal disease, exhaustion, tetanus, collapse, 1 each. The first one is the only one inherent to the operation itself, and suggests

great caution in stretching the contracted orifice. The following interesting letter of Loreta is given in answer to questions propounded by Bull: "I cannot tell you the exact number of patients operated on by me by divulsion of the pylorus because, unfortunately, a good part of the notes I had taken to serve for the statistics of this operation have been lost. The last 7 patients which I operated on, in 1887 and 1888, gave a result of 5 cures and 2 deaths. Of these 1 died from hæmorrhage; the blood flowed from the edges of the gastric incision for the reason that the suture was not sufficiently tight to serve as a hæmostatic. The other died from peritonitis, the peritoneum having been lacerated at a point of the dilated ring without my having noticed it. I saw relapses of the contracture three times in other cases, of which 2 were in women and one in a man. I have noticed that the return of the contracture and of the symptoms due to it have always shown themselves a short time after operation, or about two or three weeks after, as a rule, and this occurred every time that the dilating force had not completely paralyzed the cicatricial tissue, and hence had not brought about its immediate adipose degeneration. Of these 3 cases 2 underwent an operation for the second time, with permanent benefit. In the few patients that I have been able to observe some months or years after operation, I have been able to establish the fact that, as it resumed its normal function, the stomach became a great deal smaller."

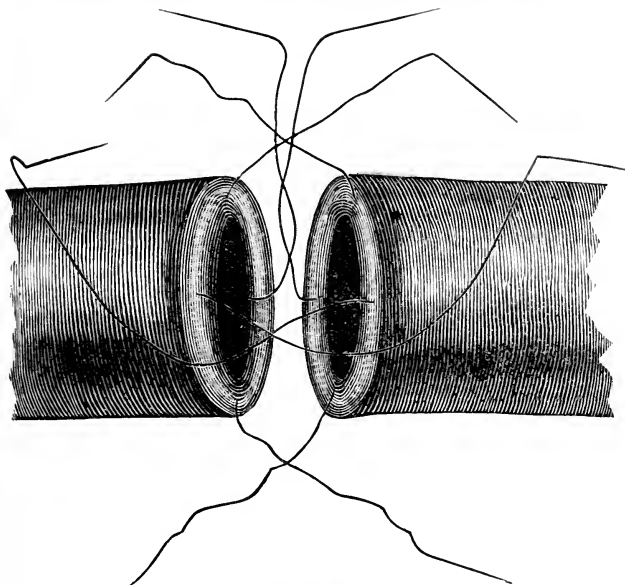
In comparing this operation with other procedures Bull directs attention to the danger of hæmorrhage from tearing the mucous membrane in dilating the orifice, and of peritonitis from tearing through the peritoneal coat. It must be gradually, even if forcibly, performed, in order to avoid these accidents. With all of these risks and uncertainties it is to be preferred to pylorotomy, which, while it is the most perfect operative procedure, is as yet too dangerous.

Gastro-enterostomy promises to show better results since the improvement in technique afforded by Senn's bone-plates and Abbe's catgut rings have been satisfactory.

Pyloroplasty, an operation devised by Heinecke and performed first by him in 1886, has afforded good results and is worthy of trial.

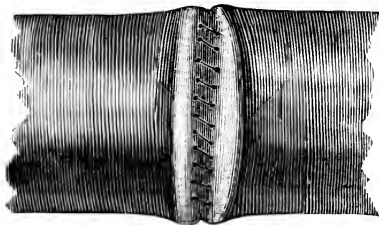
GASTRO-ENTEROSTOMY.

The introduction of Senn's decalcified approximation bone-



1.—THE RING IN SITU AND THE INTESTINES IN CONFRONTATION.
(*New Orleans Medical and Surgical Journal.*)

plates and the modification of these, Abbe's catgut rings, modified by Matas¹²_{July} (see wood-cuts 1 and 2), in operations of intestinal anasto-



2.—COMPLETE APPROXIMATION WITH CONTINUED SUTURE AFTER ADJUSTMENT OF RINGS.
(*New Orleans Medical and Surgical Journal.*)

mosis, has improved greatly the technique in the operation of gastro-enterostomy as originally devised by Wölfler. The ease with which

these can be applied reduces very much the time required in the performance of the operation, and thereby removes an important element of danger,—prolonged exposure of the abdominal cavity.

Clarke²_{Nov. 16} reports a successful case of gastro-enterostomy in a patient who suffered from a malignant tumor of the pylorus, in which he employed decalcified bone-plates. The abdominal incision was made above the umbilicus in the median line. On finding the enlarged pylorus, the finger was carried down the duodenum until the jejunum was reached, when it was pulled out of the abdominal cavity, about 4 inches of it emptied by gentle pressure, and isolated by means of two ligatures of rubber tubing passed through the mesentery at its attachment to the bowel. The bowel was then opened to the extent of an inch, the opening washed clean, bleeding points stopped, and the decalcified bone-plate slipped inside and fastened in position by its attached threaded needles. A portion of the stomach was then pulled out of the abdomen, and the second plate was fixed in position, about $1\frac{1}{2}$ inches from the pylorus and the same distance from the greater curvature. The two plates were placed in apposition, the corresponding threads of silk tied, and a few Lembert sutures of catgut were introduced around the edges of the plates. The abdominal incision was closed, the omentum having been carefully spread out beneath it. On the second day after the operation wine-ghy and veal-broth were given by the mouth. A sharp attack of pneumonia followed, which retarded the patient's recovery. Six weeks after the patient was doing very well, and gained flesh and strength. Clarke calls attention to the following points to be observed in performing the operation: 1. Sufficient portion of the stomach should be brought out of the wound so that it may be held easily, without stretching it behind the plate when the latter is *in situ*. 2. At least 6 inches of intestine should be brought out when making the connection. 3. The incision in the stomach and intestine should not be too large, and the rubber tubing should be tied loosely round the bowel.

Kammerer¹_{Nov. 23} reported to the New York Surgical Society 2 cases of gastro-enterostomy on which he had performed, end-to-end anastomosis with catgut rings, and in both of which death occurred on the second and fourth days, the first of shock and the second of peritonitis. Each ring had been secured by six sutures,

and Lembert sutures added as a precaution. He had not passed the suture lying in the angle of the incision through the walls of the gut, and found a tendency of the gut to recede over the ring at that point. In the first case, in which the patient lived four days, the ring had disappeared; in the second, the patient living two days, it was intact. Curtis stated that it was customary to use six threads with the catgut rings, and that the suture at each end of the oval catgut ring should always be passed through the wall of the intestine in exactly the same manner as those at the side. Six Lembert sutures should be added for greater security. The president of the society said that the use of catgut rings in end-to-end union was not novel. French surgeons had so employed them for over three years. He thought that a fatal issue in these cases was due to the escape of the contents of the bowel along the side of the silk ligatures, and advocated the use of catgut for sutures as well as rings. Briddon said that one of the gentlemen of the house staff of the Presbyterian Hospital, Shively, had been experimenting with chromicized gelatin as a substitute for the catgut rings. It could be molded into any shape and could then be placed in accurate position.

Page ⁶_{May 18} read a paper at the Royal Medical and Chirurgical Society on gastro-enterostomy, in which he reported an operation performed upon a patient, aged 48, suffering from pyloric carcinoma, according to the method of Wölfler. While the patient was much improved he laid for seventy-two days without gaining in weight,—a circumstance due to the fact discovered at the necropsy, that the lower end of the ileum had been sutured to the stomach. Special remarks were directed to this accident and the necessity of exercising such care as to avoid it and secure the jejunum or upper ileum. Thirty-eight cases were tabulated, in 2 of which pylorotomy and gastro-enterostomy were performed at the same time. Of the 36 cases of gastro-enterostomy 15 were fatal, directly or indirectly, as the result of the operation. Collapse was the most frequent cause, and those patients endured the operation best who were not greatly exhausted by vomiting or extension of the cancerous disease. The use of Senn's decalcified bone-plates in shortening materially the operation would contribute greatly in lessening shock. In the first 18 cases there were 10 deaths; in the second 18 cases, 5, showing a steady decline in the mortality rate.

INCISED WOUND OF INTESTINE.

Alsberg⁶⁹_{No. 26} places on record the case of a woman, aged 74, who inflicted a razor wound upon herself, penetrating the abdominal cavity by an incision 8 inches long running parallel to the right costal arch and about an inch below it. From the wound the omentum and a large mass of intestines protruded, one loop of which was cut transversely through two-thirds of its circumference. The wound was situated in the cæcum, just opposite the ileo-cæcal valve. The surrounding parts were only slightly soiled with feces. After careful disinfection the bowel wound was closed; silk double suture: the first series interrupted, the second continuous. A second wound, very small, was found an inch below the first, and was closed by a double line of sutures. The original wound was extended to Poupart's ligament in order to afford careful exploration of the abdominal cavity. No trace of feculent extravasation could be found, but on the under surface of the liver there was a small oblique wound, which bled actively and which was closed by ligature, controlling the hæmorrhage; bowel and omentum replaced; abdominal wound closed and dressed with iodoform gauze and moss pillow. Flatus passed in thirty-six hours, and spontaneous defecation on the fourth day. Death twenty-five days later, due to heart failure. Autopsy showed abdominal cavity aseptic and bowel suture so perfectly healed that it could be scarcely found.

GUNSHOT WOUNDS OF THE INTESTINES.

McGraw¹⁰⁸⁷_{v. 7} read an able and interesting paper upon this subject at the last meeting of the American Surgical Association. He gave first a detailed report of 2 cases of gunshot wounds of the intestines, in which laparotomy and intestinal suture were performed, in the first case, by Abbe, six hours after the receipt of the injury, and in the second by himself fourteen hours after wounding, both of which terminated fatally. In the first four wounds and in the second eight wounds were sutured. In reflecting upon the conditions which were found at the time of the operations and the results which followed operative interference, McGraw was led to institute a number of elaborate experiments, and the conclusions arrived at enabled him to formulate a series of propositions as follows: 1. The gravity of an injury of this kind depends partly

upon the size of the missile. Experimentation showed that wounds made with small bullets, 22 calibre and 1 drachm in weight, were more apt to be followed by an adhesive inflammation than those by missiles of greater size, and faecal extravasation less apt to occur. 2. Bullets which enter the abdominal cavity pass in a nearly absolutely straight line from the orifice of entrance through the peritoneum to that of exit, or to their final stopping-place in the viscera. This conclusion was arrived at from the course taken by sixteen bullets fired through dead animals, of which only one showed any deviation whatever from a straight line, and that but 2 centimetres ($\frac{2}{3}$ inch); and of the course taken by nine bullets fired through living animals, of which all went straight through the body, except one, which was lost in the large intestine, and, as far as this one could be traced, it pursued a straight course. From these observations the author was inclined to the belief that the whole doctrine of balls glancing from soft tissues is a fable founded upon imperfect observations and wrong deductions. The theory of a glancing bullet is not tenable. The explanation of the apparently devious route of the ball is quite easy on other grounds. In his opinion, almost all apparent deflections of bullets fired into the abdomen are due to subsequent changes in the position of the abdominal walls or viscera, caused either by muscular contraction and relaxation or by a change in the position of the intestines from the passage of gas and other causes. 3. An incision made directly in the course of the ball will give the shortest route to the injured parts. If balls pass through the abdomen in straight lines, a cut over the path of a ball will open the nearest possible way to the wounds underneath, provided the viscera have not shifted their places since the shooting. 4. The contents of the bowel may be made to discharge through a gunshot wound by manipulation and pressure. If a gunshot wound of the intestines will not, under pressure, permit discharge, it is because it has been closed by the eversion of membrane or by the exudation of plastic lymph. In either case the wound would probably recover without suture if kept perfectly aseptic, and if the bowels are kept perfectly quiet. 5. An empty condition of the alimentary canal is most favorable to healing. In cases of injury of the bowel after a hearty meal it may be proper to evacuate the stomach by means of a siphon. In small wounds of the stomach and duodenum

suture may sometimes be omitted, if the surgeon can be assured that those viscera are empty. 6. Agglutination and limitation of the morbid process consequent upon gunshot wounds of the intestines may take place as early as the sixth day. In treating these cases the surgeon should be careful to make the abdominal incision entirely within the limits of the morbid area, and employ irrigation and drainage only. 7. Senn's method of hydrogen-gas insufflation, however admissible in recent cases, should be used with great caution after the lapse of a few hours. The distention and motion of the intestines caused by the insufflation might rupture inflammatory adhesions, burst open intestinal wounds that had nearly healed, and make a peritonitis general which had become circumscribed. 8. The dangers of an operation for penetrating gunshot wounds of the abdomen are directly in proportion to the length of the operation and to the amount of evisceration. The length of the operation may be lessened, first, by strictly limiting the examination of the viscera to such of them as may have been in the course of the ball; second, by suturing the wounds in the gut, whenever it is possible, instead of excising them; third, by omitting all operative procedures, even suture, in all wounds which have become so thoroughly occluded by plastic material that the contents of the bowel cannot be passed through them; fourth, when many wounds occur near together, by operating first on those wounds which imperatively demand it and leaving to the last those which may recover without operation, and if the stomach and small intestine are both perforated the smaller intestine should be first attended to, for the reason that the empty stomach may recover without suture from severe wounds; fifth, by never eviscerating a patient, except, first, when hæmorrhage is otherwise uncontrollable, or, second, where there is evidently a discharging wound which cannot otherwise be found. Our object in operating is not to make a complete and logical operation; it is not to sew up every possible wound of an intestine; it is, if possible, to save our patients. If the chances of life are better, as I believe them in many cases to be with the omission of the exhausting methods of intestinal examination, which usually are precautionary rather than curative, then those methods, if not altogether abandoned, should be employed only when the indications for their use are positive and certain. 9. In cases of penetrating gunshot wounds of the abdomen in which

patients may be evidently too weak to endure radical operations for the repair of their injuries, efforts may be made to give them relief by operations of less severity. Laparotomy and drainage should then take the place of laparotomy and repair of intestinal wounds.

In the discussion which followed the presentation of the above propositions, the Fellows of the Association, while expressing admiration for the able and exhaustive manner in which the experiments had been conducted, declined in very positive terms to accept the views promulgated by the author of the paper. The consensus of opinion was to the effect that the experience thus far gained in the treatment of gunshot wounds of the abdomen proved most conclusively (1) that bullets traversing the cavity did, in some instances, deviate from a straight course; (2) that for the complete inspection of the cavity the incision in the median line should be employed; (3) that in seeking for wounds of the intestines it was not necessary to *eviscerate* the patient, but examine the bowel by slipping it through the hands; and (4) that in all cases where laparotomy is indicated the examination should be conducted in the most thorough manner, so that not the slightest wound of the intestine or blood-vessels should escape detection and treatment.

RESECTION OF THE INTESTINES (ENTERECTOMY).

Rubio⁴¹_{Nov. 21} reported to the Spanish Royal Academy of Medicine a case in which he performed successfully a section of ileum, removing about 8 centimetres (3 inches) of the bowel. The operation was performed to relieve a faecal fistula, which had formed in the right groin as the result of an inflamed hernial tumor. Laparotomy was performed by a small incision made in the line usually selected for the ligature of the external iliac artery. An opening in the ileum, $3\frac{1}{2}$ centimetres ($1\frac{1}{8}$ inch) in length by $2\frac{1}{2}$ centimetres (1 inch) in breadth, was found, the edges of which were in such a condition as to render it impossible to suture it successfully. The bowel, with a V-shaped piece of the mesentery was resected, and the ends sutured with catgut sutures. The patient recovered promptly, normal defecation taking place on the second day after the operation.

Cotterill²_{Nov. 2} performed resection of the transverse colon for the relief of a faecal fistula, which was the result of extensive gangrene occurring in an umbilical hernia in a woman, aged 38, who was seven months pregnant. On opening the hernial sac, a large coil of

gangrenous transverse colon and a large portion of sloughing omentum were found. The gangrene did not appear to be due to strangulation, but to pressure of the strictures in the sac, between the pregnant uterus below and a firm binder which had been worn above. Fifteen inches of colon were cut away and an artificial anus formed. Three days after operation patient gave birth to a child. Three months after convalescence the artificial anus was relieved by operation. The cut ends of the intestine having been forced from adhesions, the escape of the contents of the bowels was controlled by a piece of thin rubber tubing passed through a small opening in the mesentery and fixed around the gut by a pair of catch-forceps. As the lower segment of the bowel had been without use for five months, it was very narrow and difficult to join to the upper. Fine, curved, round needles, threaded with the finest Chinese twisted silk, were employed to introduce the Czerny-Lembert sutures, which numbered over one hundred. The cut edges of the mesentery were sutured, the bowel returned to the abdomen, and the large umbilical opening closed by deep silk sutures and the wound dressed with pad and binder. Twenty-two inches of the colon were removed in the course of the 2 operations. Time required for the operation, three hours. Fæces passed on the third day. The patient made a good recovery.

GUNSHOT WOUND OF THE INTESTINES—RESECTION.

Madill¹_{Mear}, reported to the New York Surgical Society, for Bridgdon, a case of gunshot wound of the intestines and bladder in which there were fifteen perforations of the small intestine, and in which resection of the bowel was performed. The bladder wound was not detected at the time of operation; death ensued thirty hours after operation. On admission into the hospital, examination revealed a round wound in the abdominal wall, $1\frac{1}{2}$ inches from the median line and 2 inches above the crest of the pubes on the left side, and a similar wound on the posterior aspect of the right hip, about 2 inches above the gluteal fold. No tympany; liver dullness distinct; no exploration of wounds with the probe; laparotomy performed by an incision 8 inches long in the median line, which permitted a good view of all of the viscera; eleven of the intestinal wounds were closed by Lembert sutures of catgut with a fine cambric needle. A portion of the bowel had, within a length of

1½ inch, four perforations, which it was impossible to close by suture owing to their close proximity, and the bowel was resected and sutured by Lembert sutures of catgut. The remaining portion of the small intestine, the large intestine, ureters, and bladder were carefully examined, and no wounds were found. The abdominal cavity was irrigated with hot water and sponged out dry. The small intestine was douched with hot water, returned to the cavity, omentum carefully drawn down, and abdominal incision closed by deep catgut and superficial silk sutures and dressed antiseptically. At the autopsy all of the points of suturing were found closed firmly, and there had been no escape of the contents of the intestine into the peritoneal cavity. A circular wound was found in the wall of the bladder at the fundus, a little posteriorly, and one of about same size and shape on the right side of the bladder, just above the neck. A probe passed through to the wound of the hip entered the cavity of the bladder. In commenting upon this case, Briddon remarked that the operation occupied three hours and a half, with the aid of a good artificial light, with skilled assistants, and with all other requirements at hand. No time was lost in discussion, and when it is remembered by those familiar with the technique in such cases that over 100 delicate sutures were made with the care and precision that are necessary to insure success, it will not be thought that the operation was unnecessarily prolonged; and yet it is not unlikely that the time occupied was a principal factor in the result. As to the bladder wound, the autopsy proved that there had been no appreciable escape of urine into the abdominal cavity after the operation. The character of the urine drawn off immediately before the operation led to the belief that there was a wound of the ureters or bladder, and a diligent search with a good light, and in a cavity thoroughly cleansed, was made, but without avail.

ACUTE INTESTINAL OBSTRUCTION.

Annandale ³⁶_{Mar.} read before the Medico-Chirurgical Society of Edinburgh a communication recording a case of acute intussusception in a child, 3 years of age, which was successfully relieved by laparotomy. The child, when admitted to the hospital, presented the symptoms of intussusception, which had developed two days before,—vomiting and bloody stools, with an elongated

swelling in the left side, toward the lumbar region; the swelling was not painful on pressure, but was very distinct; the abdomen was not distended. The tumor could be felt through the rectum and displaced by pressure. An attempt to reduce the invagination by small doses of opium, enemata, and the use of rectal bougies having failed, laparotomy was performed. On opening the abdomen the finger was introduced and detected a pear-shaped tumor, about 4 inches long, in the left lumbar region. In drawing the tumor toward the wound it suddenly collapsed, and about 8 inches of collapsed, wrinkled, and sodden-looking small intestine presented, and it was evident that the obstruction was relieved, as gas passed immediately by the anus. Two days following the operation the bowels were freely moved. In three weeks the patient was out of bed and a week later was discharged quite well.

Annandale directed attention to some important points in connection with this case. He referred to the small percentage of recoveries—according to Leichtenstern, about 6 per cent.—in patients between the ages of 2 and 5 years, in which spontaneous elimination by gangrene of the bowel takes place, and therefore it must be considered that, unless an acute intussusception is relieved in the early stages, it is, especially in young children, a very fatal disease. Treatment by enemata or insufflation can only be successful in its early stages, although a few exceptional cases have been recorded; in the latter stages this plan of treatment is attended with considerable risks. The tables of statistics of Treves show that the easier the reduction the less the mortality—30 per cent. in the first instance; when difficult or impossible, 91.3 per cent. In early operations a limited incision, with a limited amount of interference with the abdominal contents, will be, as a rule, sufficient to relieve the condition. Much emphasis was laid upon the importance of early operation in these cases.

Robson²_{Mar 23} describes a case in which he performed laparotomy for acute intestinal obstruction, which had existed for ten days and was due to an intestinal hernia, a loop of small intestine having become involved in an abnormal opening in the parietal peritoneum, about an inch above the crest of the ilium on the right side. In withdrawing the bowel by gentle traction from the opening it was ruptured to the extent of $\frac{1}{2}$ inch. The opening thus made was closed by Lembert sutures, and the patient made a good

recovery. Chloroform was used as an anæsthetic, and $\frac{1}{100}$ grain (.00065 gramme) of atropine was given hypodermatically immediately after the operation, which tended to diminish the shock of a somewhat prolonged procedure.

Gerster¹, places on record 3 cases of acute intestinal obstruction treated by laparotomy. In 2 of the cases *bands* were found to be the cause of strangulation; in 1, *volvulus*. In the former comparatively mild symptoms were observed in the beginning of the disorder in both instances, and, unfortunately, led to fatal procrastination. In spite of the relief afforded by the division of the bands, both patients died of peritonitis and shock, found to be present before and at the time of the operation. The operations were much complicated by the very unfavorable condition of the patients and the great tympany which rendered replacement of the intestines difficult. In 1 case, Kümme's method of tucking a disinfected towel under the abdominal parietes, using this artificial diaphragm for the retention of the intestines while the sutures were passed and closed, was found of great utility, and materially helped a rapid closure of the wound. In the other, owing to the œdema of the walls of the bowel it was not of service, the surface becoming matted to the towel,—clung to it to such an extent that large and wide flaps of visceral peritoneum were stripped up in the efforts made to reduce the distended intestines. Enterotomy was therefore performed in a loop of bowel drawn away from the rest, several quarts of liquid feces evacuated, the wound cleansed and closed by a Lembert suture. The author thinks that had the operation been preceded by an evacuation of the distended stomach by means of the stomach-tube less difficulty would have been experienced in replacing the intestines. The principal corollary and lesson of the case, however, is the fact—which he does not hesitate to express with some emphasis—that procrastination robbed the patients of otherwise good chances of recovery. In the third case, one of *volvulus*, the favorable issue was, the author believes, entirely due to the early recognition of the obstruction and the prompt measures resorted to for its removal at a time when the absence of tympanites made the steps of the operation easy, permitted expedition combined with thoroughness, and when the patient's strength was not sapped by prolonged vomiting and peritonitis.

The foregoing reports of cases of acute intestinal obstruction are taken from a large number in the medical literature of the year, and a study of the results obtained from operative interference but confirms the opinion, strongly expressed in the last ANNUAL, that the high death-rate is due largely to the delay in instituting operative procedures.

RUPTURE OF THE SMALL INTESTINE.

Croft ⁶_{June 1} records an operation on a boy, aged 14, who had sustained a rupture of the small intestine caused by a kick from a horse over the abdomen in the region between the umbilicus and pubes. Acute septic peritonitis was diagnosed fifteen hours later and laparotomy performed. On opening the abdomen, a rupture of about $\frac{3}{8}$ inch in diameter was discovered in the small intestine, thought to be in lower part of jejunum or upper part of ileum; contusion about the rupture nearly an inch across and opposite wall of bowel; also contused parts bathed in feculent inflammation products. A segment of the bowel, about $2\frac{1}{4}$ inches long at its unattached border and about $\frac{1}{2}$ inch at its mesenteric attachment, was excised and enterorrhaphy performed, a single row of about thirty-five Lembert sutures being introduced. Abdominal incision closed in the usual manner and the sutures removed on the seventh day, when the boy was taking an ounce of fluid nourishment by the mouth. Before operation temperature was 103.6° F. (39.8° C.); fell after operation to 98.2° F. (36.7° C.); since night of second day has been normal or subnormal. At the time of the record the patient was pronounced convalescent. It is believed that this is the first successful case of operation for this description of injury on record. Croft ⁶_{v.1,p.537,38} reports a similar operation in which an artificial anus was formed, the effort to relieve which some weeks later resulted fatally. Success in these cases depends upon early diagnosis and prompt operation; without operation the injury is almost invariably fatal.

APPENDICITIS—TYPHLITIS—PERITYPHLITIS.

With the reports of many cases of this affection in the current medical literature, in which surgical procedures have been adopted successfully, appear elaborate papers, discussing questions of origin and treatment—questions which, notwithstanding the

exhaustive manner in which they have been treated, seem to some to remain *sub judice*.

Weir,⁹_{Apr. 27} who has written so ably and forcibly upon this subject, presents his views in full in a paper read before the Medical Society of the State of New York, February 6th, on the "Treatment of the So-called Perityphlitic Abscess." In order to arrive at some definite conclusions with regard to the propositions,—first, that these abscesses are invariably due to inflammation or perforation at the appendix vermiformis, and, second, that, as a rule, the abscess itself is developed within the peritoneal cavity,—he analyzed 100 autopsies, with the following result: In 84 cases the appendix was perforated; in 3 inflamed and not perforated; in 4 the cæcum was perforated, in 2 of which the perforations were due to ulcerations proceeding from without inward, from abscesses opening into the cæcum; in 9 cases the condition of the cæcum and appendix was not stated. As to the site of the abscess, in 22 it was intra-peritoneal and circumscribed; in 13 intra-peritoneal, with general peritonitis; in 57 general peritonitis without abscess; in but 4 was there an extra-peritoneal abscess; and in 10 the condition was not stated.

He presented the following conclusions, based on observations of 100 post-mortem examinations and from 32 personal operations for so-called perityphlitic abscesses: 1. That all such abscesses originate in the peritoneal cavity, and there develop to an appreciable size before invading extra-peritoneal tissues or viscera. 2. That as stercoral accumulations or cæcal perforations are so rarely met with as causes of perityphlitic tumor or abscess, they should not be considered from a clinical view in any case. 3. That in an attack of perityphlitis, originating, as it generally does, as a perforation or as a gangrenous condition of the appendix vermiformis, all use of purgatives or enemata is, in the beginning of a case, to be avoided, and the immobilization of the patient is to be insisted on, and aided, if necessary, by anodynes. 4. That if a tumor be found, it be opened by a lateral incision as soon as symptoms, constitutional or local, indicate the formation of pus. 5. That if symptoms indicating an increase of the local peritonitis, such as the persistence of vomiting, spreading pain, abdominal resistance, and temperature elevation, continue, with or without the formation of tumor, for a period of forty-eight hours, the danger of the disease is greater

than the proposed lateral or median laparotomy, which should then be immediately resorted to. In many instances even a less time should be afforded the consideration of the disease before operating. 6. If a general peritonitis be suspected, corroboration can often be obtained by abdominal aspiration with a fine needle, employed in places other than in the right iliac fossa, and particularly by a deep hypogastric puncture into the pelvis, the bladder being first emptied. However, if left in doubt, it is better to operate. 7 (*sub judice*). That if general suppurative peritonitis be found at a laparotomy, lateral or median, avoid too much handling of the intestines, and trust to either temporary irrigation with large glass tubes or to permanent or repeated irrigation and fluid distention of the abdominal cavity. 8 (*sub judice*). To meet the obstruction symptoms due to septic paralysis of the bowels, which often persist after a laparotomy for suppurative peritonitis, saline purgatives and repeated washing out of the stomach should be resorted to, even though vomiting be present to a marked degree. Enterotomy may also, in exceptional cases, be entertained.

Jacobus⁵⁹_{Feb.2} read before the Northwestern Medical and Surgical Society, of New York, a paper in which he gave in detail the report of a case of perforation of the vermiform appendix, accompanied by general peritonitis, successfully treated by laparotomy by Wylie. In the discussion which ensued several important points were considered by those who participated. Wylie desired to emphasize the necessity, in all cases of peritonitis, for breaking up the adhesions,—first, in order to prevent sepsis which is likely to occur from little collections of pus which form in the pouches where the peritoneum becomes adherent to the coils of intestines, and, second, to lessen the danger of intestinal obstruction. In pelvic abscesses he does not advocate the suture of the pyogenic sac to the abdominal incision, but its removal by enucleation, washing out carefully the abdominal cavity, and the introduction of a drainage-tube.

Abbe discussed the questions of the administration of laxatives before operation and the use of the abdominal douche. The voluminous secretion produced by physics and the increased peristalsis were apt, he thought, to favor the escape of faecal matter into the peritoneal cavity, or to precipitate rupture where this had not occurred. After operation there was no question as to the

value of laxatives. When the temperature rose there was nothing which acted so well as a saline. Before operations he thought the enema a better and safer method of cleaning the lower bowel. He thought that the percentage of deaths would be found higher where general irrigation was practiced than where simple drainage was relied upon.

Bull stated that the treatment of general peritonitis by laparotomy, breaking adhesions, and washing out was conceded. The question of intra- or extra-peritoneal origin was, he thought, settled. All were primarily intra-peritoneal. The cases of operation and autopsies in which the cæcum was found outside the peritoneum, and the cases in which the abscess was found behind the peritoneum, would show a previous attack of perityphlitis as the agent which had shut off the cæcum and made it an extra-peritoneal organ. He had found the needle very useful in localized inflammations when the presence of pus was uncertain. He did not indorse an indiscriminate use of the needle, and did not approve of its perpendicular insertion. When using it in this disease he inserted it obliquely, plunging it first near the iliac border and then into the lumbar region, pointing it forward and inward to the location of the cæcum. Pus was apt to burrow in this location. In operating for perityphlitis it was not desirable to wait for the signs of general peritonitis,—vomiting, tympanites, and distended abdomen; operation should be undertaken when there were any signs of local peritonitis, and, if doubt existed, the aspirating needle should be used to make the diagnosis. Usually operation was performed too late. The exploratory incision in the iliac region was no more than a simple stab wound where the intestines were not punctured.

COLOTOMY,—LUMBAR, INGUINAL.

Cripps,²_{Apr. 6} records the results obtained by him in 37 operations, 15 of which were performed in the lumbar regions and 22 in the inguinal, with 2 deaths,—a mortality of rather more than 5 per cent. He discusses at length the subject, giving the history of the inguinal and lumbar operations, the suggestions of the former by Littre a hundred and eighty years ago, its decline owing to the fear of interference with the peritoneum, and its re-introduction some twelve years ago by Reeves, of the London Hospital. The lumbar operation, proposed by Callisen and per-

formed first successfully by Amussat, became established as one of the resources of practical surgery, and was until recently the method employed. The mortality of the operation has been very great; the analysis of collected cases—244—of lumbar colotomy made by Batt in 1884, gave a mortality of 32 per cent. The inguinal operation gave a mortality considerably above 50 per cent. These statistics, he thought, represented the results up to that period, but were misleading as affording any indication of what may be expected of the operation under favorable circumstances. He regards colotomy as an operation of great delicacy, requiring good anatomical knowledge with trained manipulative skill. The preparation of the patient, the hygienic surroundings, and the subsequent treatment of the wound all demand most careful consideration, and materially influence the result. The chief objections to the lumbar operation were stated to be: 1. The absence of sufficient working space between the lower border of the last rib and crest of the ilium. 2. Difficulty in the identification of the bowel in the limited space; the longitudinal bands are sometimes impossible to recognize; numerous instances recorded where the small bowel, the duodenum, or even the stomach have been opened by mistake. 3. In fat or muscular patients, difficulty, owing to depth of the bowel and its want of mobility, in fixing to the skin without undue tension. 4. Abnormal deviations of the bowel, rendering it impossible to find it by this incision. 5. Inconvenience of the opening behind for cleanliness and adjustment of pads.

Inguinal colotomy meets all of these objections by affording a space in front, practically unlimited, through the incision in which the bowel can be carefully inspected and identified by its longitudinal bands, its convoluted surface, and its glandular epiploicæ. The mobility of the sigmoid flexure and laxity of the skin remove any difficulty in the way of fixing the bowel without undue tension. The ease with which thorough exploration of the cavity can be made through this incision removes all difficulties attending abnormal course of the colon. This method possesses also an advantage in enabling the surgeon to verify the diagnosis by free exploration. The objections urged against the method are the tendency for prolapse of the bowel which occurs, and that it is unsuitable for urgent cases. The first can be overcome by drawing down the bowel to its full extent, and the danger in the

second is believed to be more imaginary than real. The operation is performed in the following manner: The patient having been carefully prepared by a bath and cleansing of the operative surface, an incision $2\frac{1}{2}$ inches long is made at right angles across an imaginary line, drawn from the anterior superior spine to the umbilicus and $1\frac{1}{2}$ inches from the superior spine (Fig. 1). In order to make the opening somewhat valvular, the skin should be drawn a little inward and the tissues divided until the peritoneum is reached, when this should be picked up and incised to nearly the full length of the cutaneous incision. The colon being found, a loop of it is drawn into the wound, and, if loose folds of the sigmoid

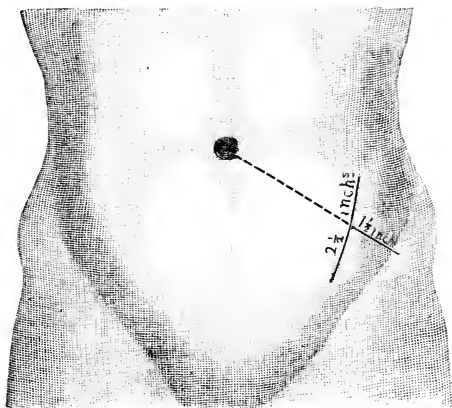


FIG. 1.—INGUINAL COLOTOMY.
(*British Medical Journal.*)

flexure remain immediately above the opening, it should be drawn down and passed through the fingers into the cavity at the lower angle. When all has passed, two provisional ligatures of stout silk are passed through the longitudinal muscular band opposite the mesenteric attachment, 2 inches apart. The bowel is now temporarily returned to the cavity and the parietal peritoneum is sutured to the skin on each side of the incision by two sutures of fine Chinese silk, $1\frac{1}{2}$ inches apart (Fig. 2), after which the bowel is fixed to the skin and parietal peritoneum by seven or eight fine sutures on each side, the last at each angle going across from one side to the other and should be so attached as to have two-thirds of its

circumference external to the sutures. The sutures for the lower side should be passed through the lower longitudinal band, as it is a strong portion of the bowel. Those for the upper should be inserted close to the mesenteric attachment (Fig. 3). It is best to pass all of the sutures and then tie them in order, with moderate tension. In urgent cases the bowel can be opened at once; if not, the opening may be delayed until the fifth or sixth day, when it is usually found to be covered with a layer of lymph of surprising thickness. The provisional ligatures will be found a useful guide, the bowel being opened to the full length between them and the superfluous

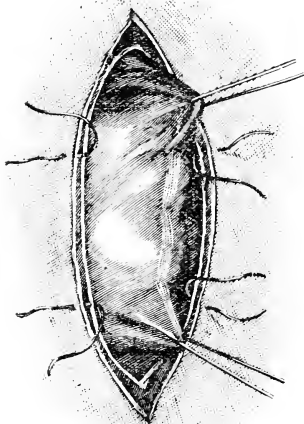


FIG. 2.

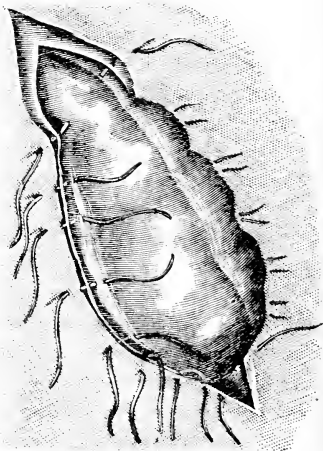


FIG. 3.

INGUINAL COLOTOMY.
(*British Medical Journal*.)

flaps on either side trimmed off with scissors to the level of the skin. All sutures may be removed by the ninth day, or earlier if there is redness around them. If the bowel is not opened immediately, a piece of protective should be placed over it to prevent adhesions of the granulations to the gauze, the wound dressed antiseptically, with an additional thick pad and a broad flannel bandage firmly applied. This is important in order to prevent tearing out of the sutures in case vomiting should occur. Firm pressure by the nurse over the wound is of great avail at this time. Tendency to contraction in the opening is overcome by the use of a spring dilator.

Kelsey,⁵⁰_{Oct. 12} in inguinal colotomy, employs the following plan in securing the bowel in position so that it cannot be dislodged by vomiting, and at the same time forms a satisfactory spur which prevents the passage of fecal matter beyond the opening. After drawing the sigmoid flexure outside of the abdominal cavity, a hair-lip pin is passed at the middle of the wound through its edge, then through the mesentery close to the bowel, at the junction of the lower and middle third of the exposed loop, and brought out through the edge of the wound on the opposite side. This method is similar to that of Madyl, who uses a hard-rubber cylinder covered with iodoform gauze, passed through the mesentery.

LIVER AND GALL-BLADDER.

Hepatic Abscess.—Five cases of hepatic abscess, treated by the late Mackenzie in the hospital at Tientsin,²³⁵_{Mar.} by puncture with a large trocar and cannula, and introduction of a large drainage-tube through the cannula. Of the 5 cases thus treated, in one of which 2 pints (1 litre) of pus were evacuated, four recovered. Attention is directed to the benefit derived from the use of an exploratory trocar in every doubtful case of hepatitis. In the experience of the author no ill effects have followed such treatment.

Dunn¹¹²_{Nov.} reports a case of abscess of the liver treated successfully by aspiration and irrigation. After two tapplings the abscess opened spontaneously at the site of puncture, discharging profusely for several days, rapidly diminishing under daily washing of the cavity with a 5-per-cent. solution of carbolic acid and finally ceasing. The author refers to the rarity of hepatic abscess in this climate, and regards the cause in this case as likely due to a probable pelvic peritonitis which had existed, the morbid material being carried through the portal vein to the liver and lighted up the suppurative process.

Williams⁵⁹_{Dec. 15, 1888} records the successful treatment of an abscess of the left lobe of the liver by incision, evacuating over 2 quarts of chocolate-colored pus. The discharge closed with cicatrization of the wound in three weeks. The abscess was one of the sequelæ of attack of dysentery through which the patient had passed unaided.

At a meeting of the French Academy of Medicine³⁶⁰_{Aug. 14, 1901} Chauvel reported 4 cases of hepatic abscess—2 in the right and 2

in the left lobe, the latter resulting fatally—treated by incision, which was made at the site of the exploratory puncture. The conclusions drawn from the study of the cases are as follow: 1. Direct opening of abscess of the liver with the knife causes no danger of peritonitis if done antiseptically. 2. The incision must be free and lead directly to the abscess. As the liver rises up after the fluid has been evacuated, it is advisable to make the opening as high as possible, and if the incision should contract by the drawing together of the ribs it may be necessary to resect one or more. 3. It is useless, and possibly dangerous, to suture the liver to the parietal wound. 4. Incision must be made early, and exploratory punctures are indicated as soon as pus is suspected. 5. It is almost impossible to recognize multiple foci accurately enough to permit of intervention in the presence of an accessible tumor. In these conditions a wide opening of the principal focus causes one of the sources of infection to disappear, and favors the opening of secondary abscesses into the principal cavity. 6. The abscesses of the left lobe are more dangerous, as may be explained by the possibility of a pericarditis by contiguity, and also by the probability of collections of pus in the already-enlarged right lobe.

Hydatid Cysts.—Thomas²_{Sept. 23} publishes an elaborate paper on the treatment of hydatid cysts of the liver. With regard to the different methods of treatment employed, he believes that ordinary tapping, parasiticide injections into the sac, and electrolysis possess little value. While simple puncture may be said to be devoid of risk, it has been known to cause sudden death, apparently from shock. The statistics of abdominal section for hydatid of the liver show extremely favorable results,—68 cases, with 7 deaths,—within a fraction of 90 per cent. of recoveries. The method of operation by two stages, producing peritoneal adhesion by incision and packing with carbolyzed gauze, showed a mortality of a fraction over 19 per cent.; the operation by caustics gave a mortality of 33.68 per cent., while that by *canule à demeure* was 26.66 per cent. Thoracic incisions for hydatids of the liver occupying the convexity of the organ show a high rate of mortality. Where a hydatid cyst of the liver has ruptured into the pleura, free incision into the pleural cavity appears to be the only treatment which holds out a fair promise of success.

Morris⁶_{Mar. 16} states that the plan of treatment adopted by him in all ordinary cases of hydatids of the liver is, first, to try the effect of evacuating the fluid contents by the aspirator, and, if this fails after one or more repetitions, to cut down upon and expose the cyst, tap it, and, having removed the fluid part of its contents, to incise its walls and stitch their divided edges to the edges of the incision in the abdominal parietes. In one case upon which he operated there were two tumors, the first of which he emptied of all its tightly-packed daughter-cysts with a common teaspoon. He advises removal of the daughter-cysts, and, when practicable, the parent-cyst, and washing out, to remove all *débris*. In removing the parent-cyst adherent portions should be cautiously detached, lest fatal hæmorrhage ensue from hepatic sinuses which may communicate with the hydatid cavity, and which may resist all means employed to close them.

Resection of the Liver.—Roggi¹¹³_{May 26} read at the meeting of the Italian Surgical Society a paper upon resection of the liver, recounting a case in which he had removed two enormous echinococcus cysts by enucleation, weighing 1300 grammes (41 ounces, 6 drachms, 21 grains), and, as it was impossible to approximate the edges of the large wound, a portion of the liver, 8 centimetres (3.15 inches) in length, was resected. The hæmorrhage was controlled by catgut sutures, and the edges of the cavity in the liver were secured in the abdominal wound. Owing to the escape of bile from the wound the dressings required, for a few days after the operation, frequent changing. This secretion gradually ceased, and healing of the wound took place promptly. A microscopic examination of the resected portion of the liver showed the orifices of the biliary canals, in the region of the cysts, patulous, a condition involving much danger if the fresh liver surfaces are left free in the peritoneal cavity. Ceccherelli remarked, in the discussion which followed, that in animals one-third of the liver may be removed without causing death. Removal of more than that amount is fatal. Postempski, in his experiments upon dogs, had found that the peritoneum withstands a certain quantity of bile if thrown into it at one time, but is not able to resist the effect of a continuous flow.

Babacci, in his remarks upon the arrest of hæmorrhage from the liver, stated that complete approximation of the cut surfaces

is necessary, and this is best accomplished by the elastic suture which has been soaked in 5-per-cent. carbolic-acid solution. This suture not only supports the parts, but fills the needle punctures, compensating, by its elasticity, for the changes in the volume of the liver. The thermo-cautery, he thought, could not be relied on to check hæmorrhages from these surfaces.

Surgery of the Gall-Bladder—Cholecystotomy—Cholecystectomy.—Credé³³⁶_{No. 29; June 29}⁹ read a paper at the Congress of German Surgeons on surgery of the gall-bladder. He reported 5 successful operations in the past two years. If, in detaching the gall-bladder from the liver, a serious hæmorrhage is produced, he does not hesitate to cauterize the liver with the thermo-cautery. He had observed that during convalescence his patient, after extirpation of the gall-bladder, had a very surprising appetite, and yet diminished in weight. This great increase in the appetite is explained by the fact that, after extirpation of the bladder, the bile flows continuously into the intestine, because there is no longer a reservoir which, in the normal state, throws an increased quantity of bile into the intestine during digestion. After extirpation of the gall-bladder there is, during digestion, not enough bile thrown into the intestine to produce an emulsion of the fats and render them absorbable, so that the greatest part of them passes out in the fæces. After a time nature will replace the extirpated bladder by dilating the ductus choledochus to form a sort of diverticulum, and then nutrition becomes normal again, for the fats can then be emulsified and consequently absorbed. The operations of the future, according to his experience, will be the extirpation of the bladder if it is diseased. Ideal cholecystotomy, to take away the calculi which are in the way of the function of the bladder while it is itself not diseased: the bladder is opened and the foreign bodies removed; the organ is then carefully sutured and returned into the abdominal cavity. Langenbuch, who had performed about 20 operations upon the gall-bladder, thought it very difficult to lay down rules in regard to such operations. Palpation he did not regard as being a certain method in diagnosing a dilated gall-bladder filled with calculi; the exploratory incision only will determine exactly with what kind of tumor we have to deal. The border of the rectus muscle may lead into error in diagnosis when palpation is employed. He operated on patients only who were

suffering from chronic disease of the gall-bladder, and who for a long time had suffered from severe hepatic colics. Of 24 personal operations of cholecystectomy, 2 died from intercurrent disease and 2 from peritonitis. He said that the ideal cystotomy presents a very serious danger. The ductus choledochus reacts to any excitation in a very remarkable manner; this is the reason why this canal becomes swollen after the excitation caused by the operation, the tumefaction preventing the free flow of bile; there is a regurgitation of it, and the bladder fills up; finally, the sutures give way and the bile is thrown into the peritoneal cavity and the patient dies. Credé stated this danger can be greatly reduced by drainage for several days and closure of the gall-bladder later, when the irritative stage has passed.

Tait⁸⁶ discusses at length the surgery of the liver, and reports up to that date 55 operations of cholecystotomy with 52 recoveries. Ideal cholecystotomy, closure of the gall-bladder after removal of the stones and its return to the abdominal cavity, and cholecystectomy he regards as based on altogether fallacious reasoning and as dangerous methods. He thinks the belief that gall-stones are formed in the gall-bladder not true,—no more true than, as a rule, urinary calculi are formed in the urinary bladder. The nuclei of gall-stones are certainly formed in the streams of bile as they flow through the substance of the liver. They are washed, as small groups of cholesterine crystals, into the gall-bladder and increase in size by further deposits of cholesterine on their rough surface. Gall-stone is, therefore, not a disease of the gall-bladder at all. The permanent existence of fistula, after cholecystotomy performed with the formation of a fistula, he believes to be due to the impaction of a stone in the common duct,—a condition which could not be relieved by cholecystectomy. It may be relieved by cholelithotripsy,—that is, crushing the stone outside the walls of the duct by means of padded forceps. As an illustration of the difficulty of diagnosis in these cases, and of the enormous distention with displacement which sometimes occurs, he related a case in which he believed a large abdominal tumor to be a parovarian cyst, and opened the abdominal cavity in the median line below the umbilicus. He evacuated nearly 11 pints of clear, gluey fluid, removed by his hand, introduced into the cyst a large stone impacted in the neck of the gall-bladder, stitched the opening of the

gall-bladder to the incision in the abdomen close above the pubes, and introduced a drainage-tube. In three weeks the patient left the hospital with the wound healed.

I have placed on record<sup>1087
v.3</sup> a case of cholecystotomy by the lumbar incision. The tumor, which occupied the junction of the umbilical and hypogastric regions, simulated a floating kidney to such an extent that the attending physician sent the patient into the hospital with that diagnosis. A careful examination rendered the diagnosis somewhat in doubt, but as the right lumbar region showed signs of the absence of the kidney an incision in this region was made with a view to fix the organ if it should be found displaced. On reaching the position of the kidney it was found absent, and pressure was made by an assistant on the abdomen to replace it. This was accomplished, and the organ fixed by catgut sutures introduced into its capsule, which had been partially dissected. On further exploration of the abdominal cavity a tumor was found lying beneath the peritoneum, which was incised and the tumor exposed and found to be a distended gall-bladder with very much thickened walls. This was tapped, removing 3 ounces of biliary pus, and then the fundus incised and the cavity explored. About 6 inches from the opening an impacted calculus was detected; as it could not be removed by the forceps at hand it was crushed and the *débris* was pushed into the intestine by a bullet-probe, the freedom of the passage being announced by the passage of intestinal gas. The gall-cyst was thoroughly washed out and fastened by strong silk sutures to the lower portion of the lumbar incision without tension. The patient made a prompt recovery from the effects of the operation. The biliary fistula closed in two months and a half. I commented upon the displacement of the distended cyst, the symptoms indicating cholelithiasis, the simplicity of the operation of cholecystotomy with the formation of a biliary fistula, and the fact that, so far as recorded cases show, this operation by the lumbar incision was the second which had been performed.

Depage<sup>276
No. 24</sup> finds, on the analysis of 78 cholecystotomies, that 3 died of acute peritonitis, 5 from hæmorrhage and collapse, 2 from biliary retention, 2 from the effusion of bile into the peritoneum, 4 from secondary causes, and 2 from undetermined causes.

Cholecystenterotomy.—Terrier<sup>3
Oct. 30</sup> reports a successful case of cholecystenterotomy performed upon a patient aged 54 years, on

account of obliteration of the ductus choledochus. The abdomen was opened by an incision in the median line, between the umbilicus and ensiform cartilage, and the gall-bladder exposed much distended. On aspiration, 400 grammes (13 ounces) of biliary fluid was evacuated. The gall-bladder and duodenum were sutured together by eight catgut sutures, which were introduced, four on each side, and tied after the openings in the gall-bladder and intestine had been made. The opening made by the trocar was closed by two catgut sutures, and, for greater security, the fundus of the gall-bladder was fixed in the lower angle of the abdominal wound, which was closed by six deep silver and twelve superficial horse-hair sutures. The author refers to the performance of the first operation by Winiwarter, in 1882, and states that up to date but 6 were known. His operation was the seventh, and the first performed in France.

SPLEEN.

Wound of the Spleen—Splenectomy.—Weir¹_(N.Y.) presented at the meeting of the New York Surgical Society, February 13th, a lacerated spleen, which he had removed by laparotomy from a girl aged 11, who, twenty hours previously, had fallen a distance of 20 feet and sustained abdominal injuries, most marked on the left side. The peritoneal cavity had been found filled with blood, over a pint being eventually removed. The spleen was found deeply lacerated on its median aspect above the hilum. It was brought easily into view, its vessels clamped, and the organ removed. The stump was ligatured, the abdominal cavity sponged out, and the wound closed. The vein of the kidney was found torn across, and this organ was also removed. Death ensued in nine hours after the operation.

Màs,⁶_{Jan. 19} of Valencia, Spain, reports a case of extirpation of a spleen containing a hydatid cyst, which was followed by a successful result. A diagnosis of hydatid of the spleen was made by exclusion, an exploratory puncture having evacuated fluid containing hydatid hooklets from a tumor of the abdomen. The absence of leukæmia was determined before an operation was decided upon. The author mentions that he was so affected by the preparations made for this important operation, and by the sight of the assistants who were to help him, that he almost fainted, and, of course, was in no condition to operate at the time appointed. Three days

later, however, he went to the house alone, gave the woman chloroform, lifted her on to a table, and extirpated the spleen, with a hydatid tumor as large as the foetal head at term, without any skilled assistants.

At the Congress of Italian Surgeons, in May, Ceci⁸_{May 28} related a case of splenectomy, which was followed by swelling of the thyroid gland, fever, and emaciation, also complete hypertrophy of the tonsils. The tonsils were excised; following the operation the thyroid swelling gradually disappeared.

D'Antona reported a case of splenectomy in a child aged 3. The patient had been suffering from a remitting fever of a severe and chronic type and the spleen was greatly enlarged. After extirpation the wound healed by first intention, but the symptoms of fever did not abate; later, gastro-intestinal complications appeared and the child died.

Sokoloff⁹⁶_{Aug.} has collected 65 cases of total splenectomy, with 24 recoveries and 41 deaths. From his analysis of the cases he draws the following conclusions: 1. The spleen represents a highly important organ directly connected with the formation of hæmoglobin. 2. The operation of the total removal of the organ in man is both practicable and (under certain conditions) justifiable. 3. Leaving aside traumatic lesions of the spleen, splenectomy may be justified and indicated in the following cases: new growths, cystic degenerations, echinococcus, and severe forms of wandering spleen. 4. A primary hypertrophy of the spleen does not occur in reality, hence it cannot possibly constitute an indication for the operation. 5. As to any secondary enlargement of the organ as caused by malaria, various diseases of the liver, heart, lungs, blood-vessels, etc., they should be altogether removed from the list of indications for splenectomy. The surgeon should always keep in his mind an enormous mortality from the operation, possibility of involution of the morbid process (as in malarial cases), and the fact that even an enlarged or partially degenerated spleen continues to carry out its highly important biological functions (including the utilization of such highly organized material as pigment).

HERNIA.

Diaphragmatic Hernia.—Postempski²⁵_{Oct.} places on record a case of successful reduction of a diaphragmatic hernia and suture

of the wound in the diaphragm in a young man who had received a penetrating wound in the eleventh intercostal space. Two perpendicular incisions were made, as for a thoraco-plastic operation, and by forcible dilatation sufficient space was obtained. The protruded part was liberated, the margins of the diaphragm approximated by forceps and sutured, and the pleural cavity was washed out and the soft parts sutured. A severe attack of pneumothorax followed the withdrawal of the hernial loop. On the eighteenth day the patient had entirely recovered.

Ventral Hernia.—Neve²_{June} reports 2 cases of ventral hernia, —1 occurring in a male patient, aged 18, in the median line, midway between the ensiform cartilage and umbilicus. On exposing the sac, it was opened and found to contain omentum, which was freed from its adhesions, ligatured, and cut away. The neck of the sac was ligatured and body removed. The abdominal opening, which did not exceed $\frac{3}{4}$ inch in diameter, was sutured, including the peritoneum. On examining the sac, it was found to be almost solid with concentric layers of blood-clot, of different color and varying degrees of organization. The actual cavity did not exceed a filbert in size, and to its walls the omentum was adherent. The second case was that of a large ventral hernia, the size of a child's head, containing omentum and bowel. The opening was about 2 inches above the umbilicus and about $2\frac{1}{4}$ inches in diameter. The sac was incised after reduction of contents, dissected out as close to the ring as possible, and ligatured with a Staffordshire knot. In order to avoid the risk of the slipping of the knot, a continuous suture was applied to the cut edge of the peritoneum. The rigid margins of the ring were approximated by deep catgut sutures, including the peritoneum. Patient discharged cured in a month.

Umbilical Hernia—Congenital.—Lindfors⁵_{Oct.} has collected 13 cases of congenital umbilical hernia, 10 of which were treated by laparotomy, freshening the edges of the hernial opening, and suture under antiseptic precautions. Three were treated by the expectant method. Of the 10 treated by surgical procedure 7 recovered and 3 died. Of 3 treated by expectant plan 2 died. Operative treatment may be instituted as early as the second day of life with success.

Martin and Harland¹¹²_{Nov.} make a very interesting report upon

hernia in children. The hernia most frequently found in children is the inguinal, upon the right side, in the male. The common predisposing cause is a congenital patulous condition of the tunica vaginalis, and dissections have shown this sac to be more commonly open upon the right side than upon the left. The exciting cause of hernia in children is commonly crying, coughing, or straining. Umbilical hernia is, in proportion to the number of cases, found more frequently in the female child; for this no adequate reason is assigned. Femoral hernia is exceedingly rare in infancy and childhood. From the sources of their information, which were extensive, not a single case was found. A narrow pelvis, short Poupart's ligament, large muscles, and complete closure of the space are all factors distinctly antagonistic to the production of this form of protrusion. An analysis of 98 cases in the male and 27 in the female shows that, in the first ten years of life, 44 per cent. of all cases occur during the first five months after birth and that 68 per cent. occur within the first year.

In regard to the relative frequency of various forms of hernia, it is found that in 970 males right inguinal occurred in 556, left inguinal in 180, double in 153, umbilical in 81. In 231 females, right inguinal in 129, left inguinal in 36, double in 21, umbilical in 45. This shows a greater frequency of umbilical hernia in females than in males,—a fact not generally recognized in text-books.

The treatment of hernia in early life should be instituted the moment the hernia is discovered. In inguinal and femoral hernia, a hard-rubber truss, the spring of which is not too strong, should be applied immediately after reduction, and should be worn day and night, and the hernia never allowed to descend. The skin should be frequently bathed with alcohol, thoroughly dried, dusted with zinc oxide or ordinary infants' powder, and protected, if necessary, by a small pad of absorbent cotton.

Umbilical hernia is best treated by bringing, after reduction, the recti muscles as closely together as possible, placing a piece of cork, the size of a dollar, or a compress of lint, over the umbilicus, and holding it and the muscles in position by the application of rubber adhesive plaster long enough to go almost completely around the body. In addition, a tight binder should be applied. A conical cork should not be thrust into the umbilicus, as this has a tendency to keep the opening patulous.

Briddon¹_{June 22} performed an operation for the relief of a strangulated umbilical hernia upon a patient, aged 52, who was admitted to the hospital March 10, 1889. An incision 5 inches in length was made in the median line over the tumor. On opening the sac, it was found to contain a large portion of omentum and a loop of intestine, 6 inches in length, deeply congested. Division of the constriction removed the congested appearance and the intestine was returned to the abdominal cavity. The omentum was quite firmly adherent to the sac, and the sac, in places, to the abdominal wall. The portion of the omentum, weighing 18 ounces, was ligatured and cut away close to the transverse colon. The sac was freed from its adhesions, ligatured, and excised. The umbilical opening, about $1\frac{1}{2}$ inches in diameter, was closed with four silk sutures. The abdominal wound was closed with deep and superficial sutures. Death took place three days after the operation, and an autopsy was not permitted.

Lumbar Hernia.—Hume²_{July 13} surgeon to the Royal Infirmary, Newcastle-on-Tyne, places on record an instance of this rare form of hernia in a gentleman, 68 years of age, who had always been constipated and suffered from frequent attacks of spasms. For fifteen years there had been a lump on his left side, usually about the size of a fist, but frequently becoming larger, and never altogether disappearing. On more than one occasion it had become enlarged and painful, with symptoms of obstruction. When examined it was as large as a child's head, and occupied the left lumbar region between the crest of the ileum and the last rib. Symptoms of strangulation had been present for two days and operation was urged, but had been declined until the third day. An oblique incision from the crest of ileum to the last rib was made, dividing skin, subcutaneous tissue, and a thin muscular layer,—anterior portion of the latissimus dorsi,—exposing the sac. On incising the sac, there was found anteriorly two coils of small intestine, one inflamed and one quite gangrenous, and posteriorly the sigmoid flexure, twisted on itself. The sac communicated with the peritoneal cavity by a slit-like aperture, which was bounded by two tense cords which caused the strangulation. On section of the constricting cords the inflamed portion of the small intestine and the sigmoid flexure were returned to the abdominal cavity. The gangrenous intestine was resected 13 inches, being removed and

the cut ends united by Lembert sutures of fine silk. The intestine was then returned to the abdominal cavity, the sac stripped out of its bed and cut away at its neck. The abdominal incision was closed by strong catgut sutures. The patient died twenty-four hours after the operation. Post-mortem examination was not permitted. Examination during the operation indicated that the hernial protrusion had taken place in front of the quadratus lumborum and had expanded, but not pushed through the anterior portion of the latissimus dorsi muscle. When the sac was separated from its bed it seemed to have lain between this muscular layer and the aponeurosis of the transversalis. The hernia did not appear to have protruded through the triangle of Petit, as is stated to be the rule in cases of lumbar hernia.

Hutchinson²_{July 13} contributes an interesting paper on lumbar hernia, presenting an abbreviated record of 29 cases. The small triangular space bounded by the external oblique and latissimus dorsi muscles and the crest of the ilium (Petit's triangle), it is generally assumed, constitutes a relatively weak spot in the abdominal wall, and that hernial protrusion may occur here, but that strangulation of the contained intestine is very unlikely to develop. Almost the only record of an operation for strangulated hernia in this region dates as far back as 1738—that of Raraton. Owen is credited with the first operation for radical cure of a lumbar hernia. The evidence as to the anatomy of this form is slight, and hardly confirms the current opinion that the presence of Petit's triangle accounts for the development of the hernial protrusion. Out of the 29 cases 16 (over 50 per cent.) developed spontaneously, or were attributed to strain, and all were in adults or elderly subjects. Males and females appear to be equally liable to lumbar hernia. Seven cases of apparently spontaneous origin were on the left side, 4 on the right. In 6 cases (about 20 per cent.) the hernia followed in the track of a previous abscess or sinus—4 in males and 2 in females. In 5 cases the hernia was due to wound or other severe traumatism of the loin, and 2 were reported as congenital. The spontaneous form is confined to the period of adult life or old age; that due to abscess or traumatism may occur much earlier. It is claimed that in the majority of cases the hernial protrusion does not occur through Petit's triangle, and also that he was not the first to describe the affection. Less-

habet, by examination of a considerable number of bodies, determined the fact that Petit's triangle was nearly always wanting in young children and in about every fourth adult man. In grown-up women it is practically constant.

Errors in diagnosis have occurred in connection with lumbar hernia as with other forms. That which has occurred most frequently has been in mistaking the hernia for chronic abscess; in one instance the intestine was incised and a faecal fistula formed. The absence of fluctuation, the presence of resonance, and capability of reduction are symptoms distinguishing hernia from abscess. A well-made abdominal belt is efficient in preventing protrusion. Radical cure by operation may be effected in this variety as in others.

Drakin¹⁰⁸⁹_{No. 10, 78} advocates ether irrigations as an excellent means for reduction of strangulated hernia. He pours a teaspoonful of ether over the hernial tumor every quarter or half hour, keeping it covered with compresses during the interval. As a rule, after 3 or 4 tablespoonfuls, the intestinal loop slips into the abdominal cavity. In incarcerated scrotal hernia it is advisable to irrigate with a mixture of ether (20 parts) and hyoseyamus oil (4 parts). The method of ether irrigation has been in vogue several years.

Gangrenous Hernia.—Richardson¹⁰⁸⁷_{v. 7} reported 4 cases, in 2 of which resection was followed by death.—1 femoral and 1 inguinal. In the third, a large umbilical hernia, recovery took place after resection, and in the fourth, also umbilical, an artificial anus followed spontaneous opening of the faecal abscess, the patient being at the time of report in good condition. Every case the author believed must be decided on its merits. The danger to life in resection in suitable cases is probably not greater than the danger of artificial anus, with the dangers attending the subsequent closure of the same. The danger of the latter operation is especially great when the opening is near to the stomach. The primary operation should only be done where all the conditions are favorable. It is pre-eminently a hospital operation. Every appliance and preparation should be ready for its most perfect performance. It is an operation not to be recommended to the general practitioner or the unqualified operator. It depends for success more often upon rapid and skillful execution than almost any other operation. In some cases this procedure is imperative where the

part necrosed is too high up for intestinal nutrition to be maintained. The difficulty is to recognize this state of things, even when it can be demonstrated that the jejunum is gangrenous. Excision is not justifiable unless the patient's condition offers some hope and there is a chance that the relief of the symptoms of obstruction may be followed by sufficient improvement to make a secondary operation possible.

Inguinal Hernia.—McBurney ⁵⁹_{Mar. 23} read before the New York Academy of Medicine a paper on the "Radical Cure of Inguinal Hernia," in which he discussed the various methods employed and presented the reports of 31 cases upon which he had operated with success. He believed it to be of great importance to reach and operate upon the extreme upper part of the neck of the sac, and to do this with certainty and safety it should be exposed fairly.



FIG. 1.—RADICAL CURE OF INGUINAL HERNIA.
(*Medical Record.*)

He thought he had devised a plan for doing so, but learned subsequently that he had been anticipated by many years by Otto Riesel, who, with the same design, advised and practiced splitting the anterior wall of the canal quite to the internal ring. The operation is commenced by a free incision, starting a little outside the situation of the internal ring and extending a sufficient distance downward over the sac, exposing the aponeurosis of the external oblique muscle. The superficial layers over the sac are now cleared away (Fig. 2) so as to plainly show the whole anterior wall of the canal. The spermatic fascia is now opened, and, one blade of a blunt scissors being pushed under the edge of the external ring, the anterior wall is split completely up to and a trifle beyond the outer border of the internal ring (Fig. 3). The deeper coverings of the sac are now dissected off, this dissection being often best and

most rapidly accomplished with the fingers. If, now, the fascia transversalis is partially removed high up in the canal, it is quite

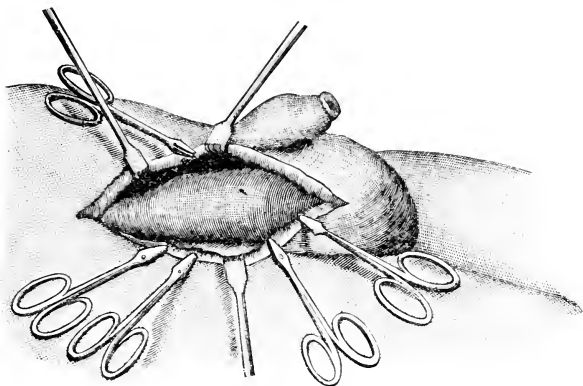


FIG. 2.—RADICAL CURE OF INGUINAL HERNIA.
(*Medical Record*.)

easy to separate the spermatic cord from the sac; and this, too, often in congenital hernia. If begun below the external ring, this

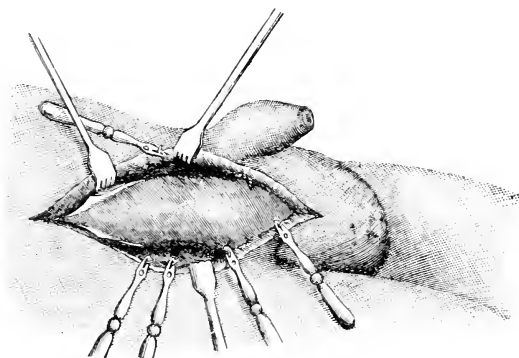


FIG. 3.—RADICAL CURE OF INGUINAL HERNIA.
(*Medical Record*.)

separation is often extremely difficult. The cord being now separated from the sac up to a point a little within the abdomen, the whole

sac is dissected out and lifted up (Fig. 4). In congenital hernia the sac is cut away from the cord at each side of the latter. The

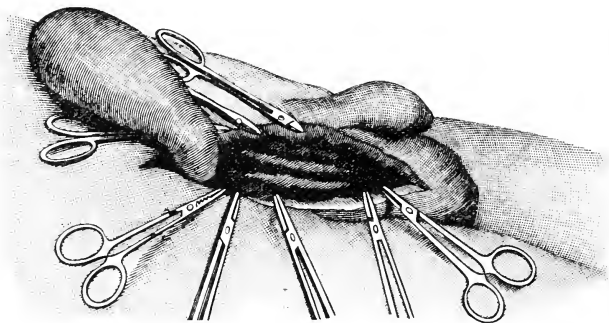


FIG. 4.—RADICAL CURE OF INGUINAL HERNIA.
(*Medical Record.*)

sac is now opened, intestinal contents reduced, omentum ligatured and cut away, and pushed completely back into the cavity. The sac is now held up vertically from the internal ring (Fig. 5), and

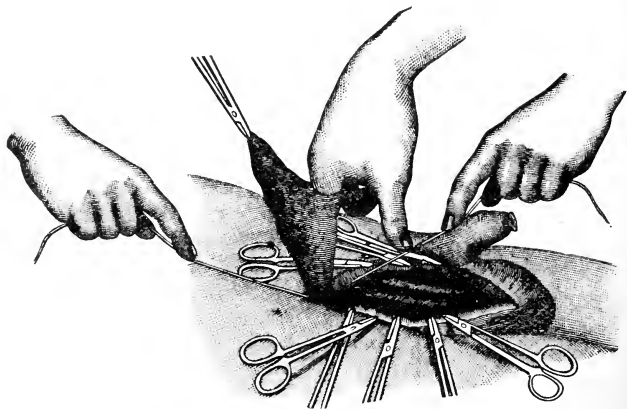


FIG. 5.—RADICAL CURE OF INGUINAL HERNIA.
(*Medical Record.*)

the operator inserts one or two fingers through the neck into the abdominal cavity in order to prevent the return of intestine or

omentum into the sac during ligation. A stout catgut or silk ligature is applied about the neck at the very highest point; that is, on a level with the general peritoneum. The ligature is tied very tightly as the finger is withdrawn, and the sac cut away, leaving a stump sufficient in size to prevent slipping. In congenital hernia



FIG. 6.—RADICAL CURE OF INGUINAL HERNIA.
(*Medical Record.*)

the neck must be carefully and smoothly sewn. In order to insure the formation of granulation from the very bottom of the wound, and to bring down the stretched and lax edge of the conjoined tendon, four to eight sutures are introduced, according to size of the wound, binding together the tissues which form the upper wall, and the same number to bind together the tissues of the

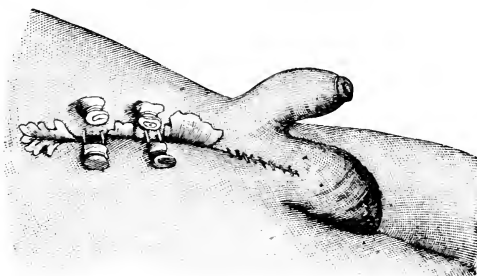


FIG. 7.—RADICAL CURE OF INGUINAL HERNIA.
(*Medical Record.*)

lower wall, the skin being carefully and deeply inverted while each suture is tied tightly (Fig. 6). This secures patency of the wound. Two or more heavy tension sutures are now passed deeply through skin and superficial fascia, and tied over pledgets of iodoform gauze to prevent ulceration (Fig. 7). The scrotal or labial

wound is sewed up simply without packing, a drainage-tube being inserted at the lower end, if necessary. The wound is carefully washed out, dusted with iodoform, and iodoform gauze is firmly packed through the entire length of the canal, the outer angle being carefully covered with the packing. Large masses of bichloride gauze and cotton are placed over the wound, and held in position with bandages (Fig. 8). Rubber tissue is applied so that the dressing may not be soiled with urine. The catheter is used for a few days. In children the dressing may be inclosed in plaster of Paris, which may be covered with shellac. The dressing is not removed for five

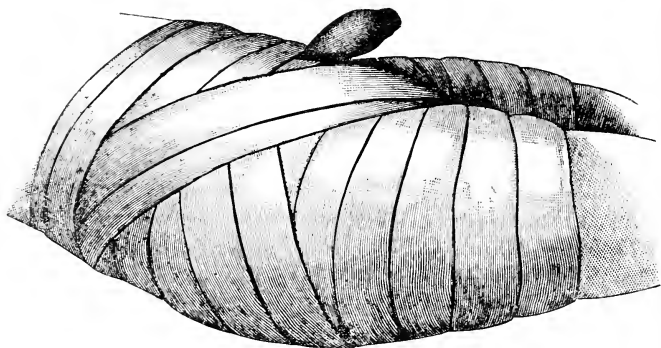


FIG. 8.—RADICAL CURE OF INGUINAL HERNIA.
(*Medical Record.*)

or six days; the packing is renewed and dressings applied, which may remain for from four to six days. The time occupied in healing, so that a clean scar is formed, is usually from five to six weeks. A truss or support should not be worn after the operation. The advantages claimed are: 1. That it is the only method in which the sac is completely obliterated. 2. That the walls of the canal are very firmly united, throughout its whole length, by strong cicatricial tissue. 3. That the wound being open the risk of abscess and septic complications is reduced to a minimum. 4. That it is rapid and applicable to every form of inguinal hernia.

DISEASES OF THE RECTUM AND ANUS.

BY CHARLES B. KELSEY, M.D.,

NEW YORK.

HÆMORRHOIDS.

THE discussion as to the best treatment for hæmorrhoids still goes on in the various journals at home and abroad. In the ANNUAL for 1889 my objections to Whitehead's operation and my advocacy of the operation with the clamp and cautery, after the method of Henry Smith, were quoted in full. Since then Whitehead,¹_{Feb. 20} has published a caustic reply, and has been in his turn answered by Brown,¹_{May 18} and Turner,¹_{June 22} both of the United States Army. Desiring to be entirely unbiased in the discussion of this question, I deem it best to quote freely both from Whitehead's answer to my article of last year and Brown's rejoinder to Whitehead, in order that the practitioner may have the question fully before him and judge for himself of the relative merits of the two operations.

Whitehead's second argument, slightly condensed, is as follows:—

“In the first place, I will attempt to restore to something like order the varied charges I find scattered throughout his (Kelsey's) paper, and, when condensed, I think that the following will fairly summarize the *gravamen* I am expected to defend:—

“1. That I have ventured with my limited experience to condemn the clamp and ligature when greater authorities, who number their operations by thousands ‘and never report failures,’ believe both these methods to be radical operations for the cure of piles.

“2. That the operation I have ‘invented’ is ‘naturally difficult, tedious, and bloody.’

“My objection to the ligature is, and has been for fifteen years, that it is an operation inconsistent with the pathological condition which constitutes piles, and consequently cannot be radical. Now,

Kelsey says, 'Whatever else may be raised as an objection to the operation by ligature, this, I believe, is the first time it has ever been impeached on the ground that it was not radical.'

"In the third edition of his Lettsomian lectures on 'The Surgery of the Rectum,' Smith, after mentioning two cases where death followed the use of the ligature, records with commendable candor his experiences of this treatment. Page 98: 'In some instances a prolonged convalescence followed, the patient being confined to bed for many weeks, while in others it happened that the wounds resulting from the separation of the ligatures would not heal up for a long period, and the patient would be subjected to much painful suffering, necessitating, perhaps, some other operation.' Again, on page 106: 'In one case where I applied a ligature, a patient of the late Dr. Wildbore, an old lady, very nearly lost her life from secondary hæmorrhage and sloughing about the time the ligature came away.' Page 109: 'In another case the ligature was followed by a great deal of suffering and the formation of an abscess at the site of ligature, which remained unhealed and caused severe pain for many weeks after the operation.' Page 112: 'This operation was followed by the most severe symptoms, notwithstanding the employment of large and continued doses of opium and the local application of ice. The pain was most intense, and the constitutional disturbance in a corresponding degree severe.' Page 113: 'This gentleman suffered a great deal of pain after the operation, and his pulse became and continued very rapid. On the 29th he became very restless, perspired profusely, and became delirious;' and on page 124 he concludes by saying: 'It is impossible for any surgeon conscientiously to tell his patient that there is no danger whatever after the ligature.'

"Here we have one of Kelsey's authorities telling of deaths, patients confined to bed many weeks, wounds that would not heal, weeks of intense suffering, secondary hæmorrhage, sloughing, formation of an abscess, and recurrence and delirium, following the use of the ligature; and yet Kelsey asserts that this surgeon never reports failures, and that the ligature has never 'been impeached on the ground that it was not radical.'"

At exactly this point I wish to note Whitehead's facility in argument. He is trying to prove that the ligature cannot be a radical operation. He is quoting from Henry Smith (the strongest

opponent of the operation) to prove the objections to it. He finds every possible objection to it *except* the one under discussion—its being *radical*—and then he calmly inserts the word “*recurrence*,” which has nowhere appeared in his quotations, as though the point under discussion and the one he was most anxious to prove had been proved by the mere fact of his quoting something entirely different, which was freely admitted without argument.

Whitehead next quotes Allingham against the clamp to prove that it is *not radical and that it fails to cure* :—

“I will now take the evidence of Allingham, who firmly believes in the ligature, Kelsey’s second authority, one of the two who, according to him, never report failures, and we shall see what he has to say about the clamp-and-cautery operation, which is the other operation I ventured to condemn.

“In Allingham’s last edition of his work, ‘On Diseases of the Rectum,’ edited by his son, the following appears on page 127 : ‘In my opinion, this operation (clamp and cautery) has little to recommend it. As regards danger to life—after all, the issue of the greatest moment—as far as my most careful researches have led me to a conclusion, it is quite six times as fatal as the ligature properly and dextrously applied. There are, moreover, these disadvantages : The burning causes very great pain after the operation, especially if the skin is involved; secondly, hæmorrhage is more likely to occur than after the best modes of operating. greater sloughing of the parts takes place, and a longer period is required for healing. The after-results are likely to be unsatisfactory, for contraction is common.’

“So much for these ‘greater authorities’ never having reported failures.”

We have only to ask, as before: Where does the quotation support the point Whitehead is trying to defend—that the clamp and cautery is not a *radical* operation and fails to cure? The author quotes Allingham against the clamp—says all against it that can be said—and once more takes for granted that he has proved what is under discussion without even having in any way touched upon it.

Brown, in his article, says the communication by Whitehead “is evidently intended by that gentleman as a crushing reply to a most temperate and judicial comparison by Kelsey of Whitehead’s

method of treatment by excision with the other operations now in use by surgeons.

“But it is in no sense of the word a reply to Kelsey, because it most completely avoids meeting the issues made by him, and, after a most ‘illogical’ attempt to convict him of inconsistency and ‘reckless disregard of fact,’ degenerates finally simply into a tirade of illiberal and unprovoked personalities. On this account it is highly probable that Kelsey will not notice it at all, although the manner in which Whitehead ignores the issues made by him and perverts the authorities he quotes in support of his assertions certainly seems to demand attention.

“The points made by Kelsey are:—

“1st. That Whitehead alleges superiority for his method in the operative treatment of hæmorrhoids by excision, because the ligature and the clamp and cautery ‘by no means produce a radical cure.’

“This latter statement Kelsey asserts is not warranted by fact or experience.

“2d. That Whitehead’s operation is a ‘naturally difficult, tedious, and bloody operation.

“Kelsey also asserts that the clamp-and-cautery operation will radically cure, and will cause less pain, less vesical disturbance, and less danger of surgical accident than any other known method.

“To meet the first point Whitehead makes exhaustive quotations from Henry Smith, specifying page and gleaning various and sundry mishaps from the ligature—*e.g.*, ‘death,’ ‘prolonged convalescence,’ ‘painful suffering, necessitating perhaps some other operation,’ ‘secondary hæmorrhage and sloughing,’ ‘abscess,’ ‘intense pain and constitutional disturbance,’ and ‘delirium,’ but fails to find *recurrence* as following the application of the ligature—yet, in summing up in one paragraph all these accidents enumerated by Smith, he inserts ‘recurrence’ among them!

“Whitehead then most logically quotes largely from Kelsey to show that the latter quite agrees with himself in condemnation of the ligature in all respects except the point at issue—‘recurrence.’

“Allingham’s opinion of the clamp and cautery is next given by Whitehead, but he finds no charge of ‘recurrence’ there either. Next he finds, on further search of Smith’s work—page

115—‘a case of a lady who had undergone one or two operations with the ligature with only partial success!’ Then he quotes Kelsey and Allingham both to testify that in certain complications ‘small ones [piles] may be overlooked and not tied, which are likely to grow, and a return of the piles may be confidently anticipated in a few months.’ Is this Whitehead’s idea of a ‘recurrence’?

“So much for ‘hypercriticism’ and ‘reckless disregard of facts’—polite terms which Whitehead permits himself to use toward Kelsey.

“Kelsey’s second specification—that ‘excision is a naturally difficult, tedious, and bloody operation’—Whitehead disposes of most summarily by saying ‘many young surgeons, early in their professional careers, have assured me that they found no difficulties in the operation.’ As to its being ‘tedious,’ Whitehead remarks: ‘All I have to say is that it can be completed in an average case in ten minutes.’

“Does Whitehead ‘expect us to accept his assurance’ that he, or any other surgeon, can ‘remove the whole pile-area’—which he distinctly states ‘is one of the conditions of success in his operation’—in ten minutes? This certainly was not the experience of so skillful a surgeon as Weir in the cases reported by him, though he made manifest improvements in the method of operating recommended by Whitehead.

“In defending his operation from the charge of being ‘bloody’ Whitehead quite loses his temper, and descends to personalities and egotistic sneers.

“It is difficult to conceive how he can proceed to say that Kelsey ‘reluctantly makes the concession that he agrees with Weir that after excision the recovery is quicker, and the reaction, as shown by pain and difficulty in urination, is less than that following the ligature.’ What Kelsey really does say is this: ‘Weir compares these results very favorably with those of the ligature, and I think with perfect justice;’ but why does Whitehead stop short here and ignore the words of Kelsey which immediately follow—‘but with regard to the clamp-and-cautery method the same certainly is not true’?

“Here Whitehead abandons all pretense of argument, and berates Kelsey with abusive epithets, which only demonstrate that he cannot appreciate the candor and sincerity of one who, in his

investigation of a method which for a time promised so much for suffering humanity, had published 200 consecutive cases of success with carbolic-acid injection, yet, when further experience convinced him that his hopes were unfounded, frankly said so.

“Such conscientiousness apparently so confounds Whitehead that he calls it at first ‘vacillation,’ and finally ‘audacity.’

“Now permit me to say a few words on what I know of the clamp-and-cautery operation as practiced by Kelsey. For more than twenty years I suffered from hæmorrhoids in such a way that at times life became a burden which I almost wished to lay off. But circumstances debarred me from the opportunity of availing myself of the chances of relief from an operation, and I confess that the fearful agony which I often saw following the use of the ligature made me still longer delay. until when carbolic injection began to attract the attention of the profession I put myself under the hands of a careful and judicious surgeon, and for two years faithfully followed that treatment,—not continuously, of course, but giving it a fair and persistent trial. At first I was much relieved, but it failed at last, and my case became so serious that I consulted Kelsey. I have no intention of reporting my case here. Suffice it to say that Kelsey removed successively 6 very large hæmorrhoidal tumors with the clamp-and-cautery—one of them so large that it could not be embraced in one grasp of the clamp, but required a second cut. Kelsey pronounced it the largest internal hæmorrhoid he had then seen. Expressing a doubt of my ability to bear ether, Kelsey permitted me to venture the operation under local anæsthesia by cocaine, having his assistants ready to put me under the influence of ether should the pain prove greater than I could bear.

“Six minims of a 15-per-cent. solution of cocaine were therefore injected at the base of each tumor, and the operation was commenced and finished in a few minutes, I being fully conscious of every touch of the instruments and of each step of the operation, but feeling no pain that I could not easily bear.

“The operation was finished at about 3 P.M. At 8 o'clock the same evening, as I was suffering chiefly from bladder tenesmus, Kelsey directed me to get up and go to the water-closet to try to relieve myself by an effort to urinate. I did so, and after considerable waiting and straining succeeded, and twice before morning

I did the same, walking across the bed-room to the bath-room and back to bed after relieving my bladder.

“In forty hours I had my first passage from the bowels, suffering far less pain than at any previous defecation for weeks before the removal of the tumors. From that day I was walking about the room as I pleased, and in ten days from the operation was able to return, without suffering, to my home from New York City, which involved a twelve-hour ride by rail.

“These results, which are the average from the clamp-and-cautery method by Kelsey, I cannot find approached by either those of the ligature, excision, or even the alluring but delusive promise of carbolic-acid injection, either in rapidity of performance, comparative immunity from after-pain or vesical disturbance, rapidity of recovery, perfect restoration of the functions of rectum and anus, and the whole crowned by almost absolute impossibility of recurrence.”

In any argument it is well not to lose sight of the original propositions, as may easily and very naturally be done in the midst of side issues which are sure to arise.

The writer's original statements were simply these:—

1. That though *Whitehead's operation was good*, it showed no better results in his own hands than either the ligature or the clamp could show in the hands of others.

2. That Whitehead's statement that neither the ligature nor the clamp effected a *radical cure* because they did not amputate the entire mucous membrane of the lower end of the rectum was based entirely on his own limited experience with these methods, and was clinically erroneous, as proved by the every-day experience of surgeons all over the world.

3. That Whitehead's method of operating was necessarily a tedious and bloody one; and, this being the case, would not long be popular unless it showed better results than the methods we already possessed, which it had not yet done.

Writing as I did in 1889, it is not perhaps too much to assert that the last prediction has already been fulfilled in 1890, and that in all the discussion of the past year nothing has been put forward to invalidate the other two propositions. The question is simply this: Do or do not the clamp and the ligature in the hands of their advocates effect a radical cure? In answering this it is begging

the question for Whitehead, as he does in his article in answer to the writer, to quote Allingham against the clamp and Smith against the ligature, unless they show cases of recurrence after operation, and this *neither of them does*. Pain they do speak of, and also secondary hæmorrhage, but neither claims, or has ever claimed, that the other's operation was not radical, and it is useless for Whitehead to make such a claim now in support of his own operation in the face of every surgeon the world over who has been curing his cases all his life by one or other of these two operations.

It being admitted, then, as it must be, that all three of the operations effect a radical cure, the choice between them must rest upon other elements—danger, pain, time of convalescence, simplicity of operation, etc. On all these points I prefer the method by the clamp, and Whitehead prefers his method by excision, and unless some new data be added to the discussion every practitioner may practice the method he chooses.

Although in my original criticism of Whitehead's operation I said nothing against it, but confined myself simply to refuting what I considered unjust charges against my own favorite procedure, were the point to arise *de novo* I should not be perhaps entirely on the defensive. I have *never* practiced his method, and it is a great pleasure to take this opportunity for saying so in answer to his question as to my experience with it. The reason for never practicing it has certainly not been the lack of opportunity, but the deep conviction that my own operation was much preferable. But I have carefully watched the results of his operation in the hands of New York surgeons of world-wide reputation—men to whom no suspicion of incompetence or lack of skill could attach—and I do not think I go too far in now asserting this general proposition:—

No operation for hæmorrhoids is a good one in which the question of curing the patient or leaving him necessarily with a severe stricture of the rectum depends absolutely on getting union of the cut surfaces by primary intention.

Primary union of a rectal wound is more or less doubtful in every operation. In neither the ligature nor clamp operations is it striven for. Failure to obtain it in Whitehead's operation means severe stricture. That this result may follow his excision there is

now abundant evidence, and this evidence constitutes a stronger objection to the method than any set forth in my original criticism of it. Again, though anxious to carefully distinguish between any fault in the operation itself, as contrasted with a possible fault of the operator, the case recorded by myself^{Oct. 5} must be allowed its full weight, as showing the results of the method in unskillful hands—though the operation was performed in one of our largest New York hospitals. In this case the primary circular incision had been made a little too far out upon the cutaneous surface and the mucous membrane drawn down to it. Union by first intention had occurred, but the natural muco-cutaneous outlet of the alimentary canal had been transformed into a mucous one—already eroded and ulcerating. The fault of the operator and not of the operation it was, but by no other method could it have occurred in any hands.

In closing what I have to say on this subject it may not be out of place to add that Whitehead's method has been thoroughly tried on this side of the ocean; that as a surgical novelty it has given a certain number of satisfactory results—and some bad ones; that it is one more means at our command for curing hæmorrhoids, but that nearly all who have practiced it here have been content after a few trials, and have returned to the older and time-honored methods as being simpler of execution and equally satisfactory in giving a radical cure.

Personally I have never attacked Whitehead's operation, and am still content in defending the clamp and cautery against any attack Whitehead has thus far made.

As illustrating the increased interest now shown in all questions relating to rectal surgery, the sharp way in which Allingham's classification of piles has been handled during the past year is amusing.

He, unfortunately, in both his later editions speaks of an "arterial hæmorrhoid," one into the base of which "an artery, sometimes the size of the radial," enters. To all conversant with rectal surgery this statement has been a palpable exaggeration for years, and yet a harmless one, going to enforce the pathological fact that some hæmorrhoidal tumors partake of the arterial element to a much greater degree than others. We say pathological fact because, with Allingham, we believe it to be such.

Whitehead²_{Dec. 8, '88} was the first to call attention to the objections to Allingham's classifications in the following communication²_{Dec. 8}:—

“I have just finished reading the last edition of Allingham ‘On the Diseases of the Rectum,’ and it astonishes me to find, among other things, that he retains his belief in the arterial hæmorrhoid, and that he remains convinced that at times arterial hæmorrhoids occur as perfectly distinct varieties of piles. If Allingham contends, as he appears to do, that arteries, like veins, become dilated, sacculated, and tortuous, frequently contain thrombi, and sometimes become, through inflammatory changes, reduced to consolidated tumors, I venture to express my decided dissent from his view, and I will, with your permission, briefly state the reasons upon which I do so.

“1. In the first place, upon *à priori* grounds, we should not expect to find the arteries of the rectum in a condition of cirroid dilatation, a condition Allingham certainly infers to exist. Cirroid dilatation of arteries is, we know, an exceedingly rare condition to find in any part of the arterial system, and when it does occur the instances are almost invariably met with in the upper half of the body. Cirroid dilatation of arteries may be said to be as rare below the waist as varicose veins are common, and varicose veins as common in the lower half of the body as they are rare above.

“2. In varicocele, and in the familiar varicose condition of the saphenous veins, analogous in every respect to venous hæmorrhoids, we find no corresponding diseased condition of the spermatic artery, or of the arteries correlated with the saphenous veins, notwithstanding that varicocele, varicose veins, and venous hæmorrhoids not infrequently exist in the same subject, and apparently depend upon the same initial cause.

“3. Most of the causes which are supposed to induce venous hæmorrhoids would exercise the very reverse effect upon arteries, and yet venous and arterial hæmorrhoids are alleged to exist together, as well as independently, and to be the result of the same cause.

“4. If hæmorrhoids were sometimes of arterial origin we should expect occasionally to detect expansile pulsation in some of the tumors. I have examined hundreds of piles with the object of deciding this point, and in every instance I have failed to discover pulsation.

"5. For the last ten years I have with persistency operated upon piles by excision, and during that time I have treated considerably upward of 300 cases without finding an exception to the venous composition of the tumors. The details and nature of the operation admit of no error of observation, as the pile area is fully exposed for inspection, and it is perfectly easy to discriminate, accurately and positively, between the diseased veins and the healthy arteries.

"6. Finally, I am strengthened in the opinion I hold by the independent and corroborative testimony of numerous surgeons of unquestionable authority, who have adopted the removal of piles by excision, and who unanimously declare they have never seen any condition to warrant the assumption that piles are of arterial origin."

Whitehead was immediately followed by Cripps with the following ²_{Dec. 15, '88} :—

"I see in last week's issue of the *Journal* Walter Whitehead has very properly drawn attention to a singular error concerning the pathology of piles. I have not yet had an opportunity of seeing the edition to which he alludes, but am well aware how many writers use the expression 'arterial piles,' a disease which I believe has never been verified by a post-mortem examination, and one which I have certainly not seen in the living body. The following extract I take from my work on diseases of the rectum, published four years ago, as bearing on this point. 'The fact of blood escaping in jets has led some high authorities to regard it as arising from some arterial twig. With due deference to such eminent authorities, I am of opinion that they are mistaken, and do not believe that the blood ever comes from the arteries, but that the jet is caused by its being forced as a regurgitant stream through a minute orifice in a vein by the powerful pressure of the abdominal muscles.'

"I believe that it is this jetting of the blood which has given rise to the assumption that some piles are arterial; but yet a little reflection will show that the jet appearing only when the abdominal muscles act, and the blood of the veins is subjected to pressure, shows that its source must be venous; if arterial, the effect of straining and compression would tend to diminish rather than to promote the spurting.

“In many cases of hæmorrhoids the bleeding is of the nature of an oozing from soft vascular patches of mucous membrane, and it often happens when examining these cases that the slightest friction with the finger produces blood exudation. Apart from the evidence afforded from the effect of straining as showing that the blood when it jets comes from a vein, I have on more than one occasion detected the actual opening in the vein from which the blood-stream exuded. In one case, that of a woman reduced almost to death's door by hæmorrhage recurring for many months when at stool, I observed on the summit of one of the piles a little adherent clot of blood. On removing this it was found to be blocking up a minute circular opening in the walls of a dilated vein, into the interior of which a fine probe could be readily passed.

“In another case in which the jetting was a prominent and serious symptom, I discovered an exactly similar opening after wiping away a protecting clot. On telling the patient to strain down, a minute jet was immediately expelled a distance of several inches. In conclusion, I believe there is no evidence, either from life or from post-mortem examination, to show that a pile ever consists of varicose arteries, and I trust that Whitehead's letter may be the means of clearing away a piece of bad pathology.”

The answer to this by Herbert W. Allingham²_{Jan. 19} seems to cover the whole ground:—

“SIR: Nowhere in our work is there any mention of the arterial origin of piles. As Whitehead does not like the classification of piles into the practically useful division of arterial, venous, and capillary, I think he may agree that in the variety we call arterial the arteries are more numerous than in the tumors we please to call venous. If, therefore, Whitehead objects to the term arterial because the pile is not composed entirely of arteries and nothing else, what name for clinical purposes is to be given to that variety of pile in which, from the following symptoms, arteries must largely exist in the tumors?

“1. Tumors from which there is persistent arterial hæmorrhage, which is far more exhausting than the venous hæmorrhage from venous piles.

“2. Tumors from which arterial blood issues *per saltum*, while in the purely venous kind it only oozes out or runs away in a stream.

"3. Tumors which are not so dependent upon constitutional causes, being more particularly a local disease (as in young people), and are not affected by excesses in diet, etc., and are therefore less amenable to palliative treatment.

"4. Tumors which have a greater tendency to bleed, the blood being of an arterial character.

"5. Tumors in which, on examination, large arteries are found entering them; arteries certainly much larger than are felt when examining the healthy bowel.

"We humbly think the name arterial pile distinctly and simply explains the variety of tumor above described, and which clinically is quite distinct from the venous pile.

"To answer Whitehead's last paragraph, I quite admit arteries enter most tumors, but, as tumors are additions to the normal part, surely the arteries of the normal part enlarge to supply this addition."

It would seem as though a great deal of writing had been done over a very small point in pathology. Piles are certainly enlargements of the hæmorrhoidal veins and not cirroid aneurisms of the rectum; and yet, as Allingham says, some of them contain a much more abundant arterial supply than others. If he chooses to call these "arterial hæmorrhoids" there is no objection, provided we understand his meaning, and he has made that sufficiently plain in the communication quoted.

FISTULA IN ANO.

I would here introduce a study of my own of the methods of treatment of the more complicated cases of fistula, and of incontinence of fæces following operations on them.

The general idea of the operation of cutting a fistula in ano is a very simple one. It is that a director should be introduced into the external orifice, brought out into the rectum through the internal opening, or at a point where its end approaches most nearly to the mucous membrane, then bent and brought out of the anus, and that the tissues upon it should be cut.

This is the idea conveyed to the student by his lectures, and to the practitioner by his text-books on general surgery, and in many, perhaps the majority, of cases, this simple procedure will be curative; for many fistulæ are straight tracks running not very

deeply into the tissues, and it is to them, and to them only, that the operation applies. But no practitioner will cut many fistulæ in this off-hand, routine way before meeting with a case in which such an operation will either prove a signal failure or will result in irreparable injury to the parts.

Perhaps the first lesson taught by an unexpected failure in effecting a cure by this operation is that a fistulous track is something to be followed by a careful dissection, and not a thing to be laid open by a single sweep of the knife along a director which has, by more or less force, been entered at one opening and made to pass out at the other; for by this course not only is the track often left in great part undivided, but the director is forced into healthy tissue and parts are needlessly sacrificed.

Instead of this, the track should be followed step by step from its external opening along its whole course; and to do this the director need only be introduced a short distance at a time. By thus following carefully the course of the fistula no unneces-



FIG. 1.—PROPER SHAPE OF A FISTULA GROOVED-DIRECTOR.

sary sacrifice is made of adjacent healthy tissue, and side-tracks or diverticula are recognized as they are met. This is much easier than to pick them out in the bottom of an extensive bleeding and irregular wound.

A word about the director. The one ordinarily used is too blunt at the end for fine work. It should be of steel, delicately made, and probe pointed (Fig. 1); silver is too flexible for ordinary work. These have been made for me in three sizes by Tiemann.

With regard to side-tracks, or branching diverticula, the rule is that all such should be dissected up exactly as the main track should be; but to this there are very important exceptions. The rule may perhaps be modified in this way: As many tracks should be divided as can be done without the risk of incontinence of fæces in either sex, or of destruction of the perinæum in women, or of too great injury for the reparative powers of the patient.

As a rule, both the sphincters in either sex may be divided

once in the median line without danger of incontinence. It is better, however, to divide as little as possible. The inner should be left intact, if possible; the division should be straight across the muscular fibre and not slanting, and a double division of one, and especially of both sphincters, should not be resorted to as a primary operation. In women and phthisical male patients there is more risk than in men otherwise healthy.

In these modifications of the rule of complete division cases of tracks running upward along the bowel are not included, for these should be divided as are those nearer the anus.

Here the supposed danger of hæmorrhage often stops the operator with his work half completed, and one of these tracks

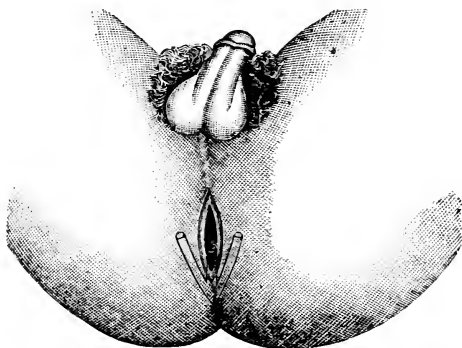


FIG. 2.

will often heal spontaneously after the opening of the lower one into which it empties. But it is not safe to trust to this chance. These upward branches are of two distinct kinds. In one the track runs directly beneath the mucous membrane, and may be so found with the director; and in this there is little danger of hæmorrhage in its division, for the blood-vessels are all beneath it. In the other variety the track runs deeper into the wall of the gut, under the muscular layers, perhaps even away from the rectal wall into the perirectal tissues. In such cases there is great danger of hæmorrhage, and the division may be more safely done with the elastic ligature or the enterotome.

The exceptions to this rule of complete division will be found

in three classes of cases—those of the horseshoe variety, the recto-labial variety, and the old cases of extensive disease, where the whole anal and perineal regions are riddled with openings. In these cases all the ingenuity the operator possesses will be demanded to effect a cure without resulting incontinence.

Horseshoe fistula has been defined differently by different writers. In a typical case it is a form of fistula in which there are one or more external openings on each side of the anus and an inner opening in the rectum in the median line behind. It is shown in Fig. 2, after Goodsall. But a horseshoe fistula may have only one external opening, and yet the abscess which has caused it may almost entirely surround the gut. Nor need the

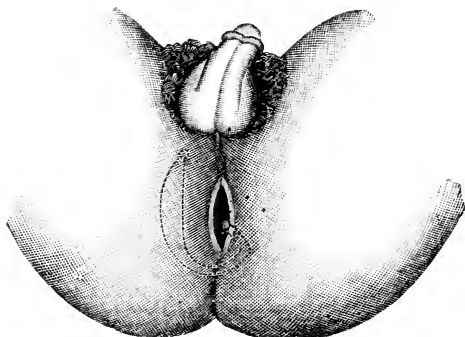


FIG. 3.

internal orifice be in the median line, either behind or in front. The name applies better to the shape of the abscess which has resulted in fistula than to the location of the openings. In this form of disease the pus in its burrowing has extended from one side of the gut to the other, and the resulting fistula may be complete, incomplete, or of the blind internal variety. The internal opening may be at any point, and the external may be on the opposite side of the body from it (Fig. 3).

In these cases I think it will generally be observed that the openings do not lead into distinct fistulous tracks of any great extent, but rather into one abscess-cavity of considerable size.

It is evident that in operating upon such cases as these there is a chance for much skill in effecting a cure at one operation, and

still preserving the sphincteric power. And I may say that a patient who has been left with incontinence of faeces after this operation is apt to be very unforgiving, especially when it happens to be a lady who has been rendered loathsome to herself, afraid to trust herself in society, and doomed to the constant wearing of a napkin. I have seen several such, and by means to be referred to have relieved some, but from the ill fortune of others I have come to warn my own patients that incontinence may possibly result when I see any reason to anticipate such a conclusion.

Taking now a case of horseshoe fistula, such as is shown in Fig. 2. The ordinary operation would consist in two complete divisions of the sphincters on opposite sides (Fig. 4), probably resulting in incontinence. The correct method, as is shown by

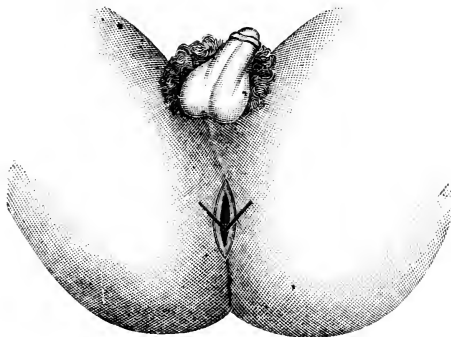


FIG. 4.

Goodsall, consists in one complete posterior division, and then the opening of the lateral tracks into this posterior cut, as shown in Fig. 5.

This principle may be made to cover nearly all of this class of cases. Where several external openings are grouped around the anus they may all be connected by one incision, and from this incision a probe may be passed through the internal opening, and this, too, divided with the sphincter.

In case the external opening be at a considerable distance from the anus, and on the opposite side of the body from the internal, as shown in Fig. 3—drawn from a case of my own—the method is essentially the same, the thing to be avoided being a slanting cut through the rectum and healthy tissue. By following

the ordinary rule in such a case—passing a director into one opening and out of the other and cutting upon it—all but a small portion of the lower end of the bowel will be completely severed by a deep incision. Fig. 6 shows the cuts that were made by which a cure was effected without incontinence.

It may easily occur that in a complicated case it is found impossible to divide all of the tracks without a double or even triple division of the muscles. In such cases the safer practice is to do such an operation as has been indicated upon all the tracks that can be included in a single division of the muscle, and to trust to other means of cure for the balance; at least, till the first wound has healed.

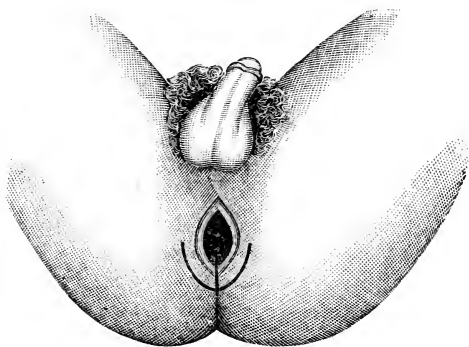


FIG. 5.

The most reliable of these other means is the injection of strong tincture of iodine into the uncut tracks. Many of them will have been thoroughly drained by the first incisions and will heal with the additional stimulus of this treatment. They may even be thoroughly cauterized with fused nitrate of silver at the time of the operation.

The second class of cases in which it may be unjustifiable to divide all the tracks at the primary operation is that of the recto-labial fistulæ.

This form of disease is in most cases due to inflammation of one or both vulvo-vaginal glands or their ducts, leading to suppuration and the final escape of pus, both on the labia and within the rectum. There may be numerous external and internal open-

ings. In the case shown in Fig. 7, recently operated upon in consultation with Kennedy, there was a labial opening on each side. The right track had opened on the anterior wall of the rectum in two places, the left in one, and the right and left tracks communicated by a submucous track in the rectum. In such a case the division of both tracks would result in a complete double division of the whole perinæum, as well as of the external sphincter.

The cuts made at the primary operation are shown in Fig. 8.

A probe was first passed through the track on the right side, from the external opening down to the verge of the anus, its end cut down upon and brought out through the skin of the perinæum at the point B. From this point it was carried along the fistula to

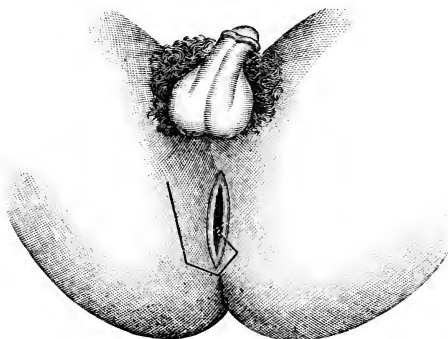


FIG. 6.

the internal opening on the same side, and this part of the track divided with the sphincter. The director was then again passed from the opening D to the first cut and the cross-track divided. Finally, all of the submucous tracks were slit up, and the track on the left side, from its internal opening as far as was possible, without complete division of the sphincter at that point. Setons were then passed along what remained of the original tracks and tied. The result was not a perfect cure in the first instance, only the rectal tracks being closed, but by the primary operation the subsequent treatment of the two straight perineal tracks was rendered much simpler.

I. E. Taylor¹⁰²⁴ has made a careful study of this rare form of disease, and describes two different methods of operating, both,

however, with the elastic ligature. The first is that recommended by Barton, in which a ligature is passed from the labial to the rectal orifice and brought out at the anus; an eyed probe is then passed from the labial orifice down along the perinæum till it reaches just outside of the sphincter and low down, its point is cut down upon, and the labial end of the ligature is drawn through this artificial opening and the ends fastened. The other operation is the same, except that the stages are reversed, the artificial opening being first made and the ligature passed from this through the rectal opening and brought out at the anus. In this way the track through the

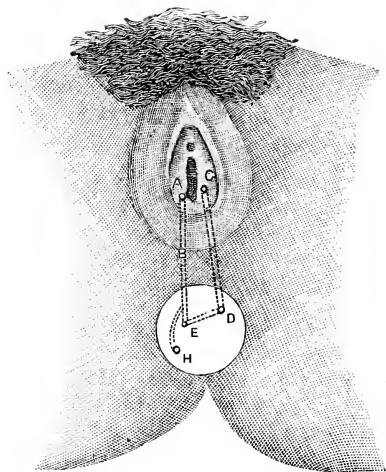


FIG. 7.

perinæum is not divided, but is left to close with appropriate stimulating applications.

The blind internal fistula is the one which, more than all others, leads to mistakes in diagnosis. The absence of any external orifice misleads the superficial examiner at the beginning, and the failure to make a thorough examination completes the error.

There are two signs of this condition which will in every case lead to a correct diagnosis. The one is the discovery of the internal orifice; the other, the induration which invariably attends a track of any size. Again, there is something significant in the history, and I have learned by experience, when a patient gives all

the usual symptoms of fissure, and yet has no fissure, to examine, under ether, for a blind internal fistula. I say examine *under ether* advisedly, for a complete examination without ether and a large-bladed speculum is an impossibility. Often a careful search over the lower three inches of mucous membrane will reveal a small ulcerated opening, and a probe passed into this will run for an inch or so under the mucous membrane. In other cases the finger will first detect an indurated spot or track, and a careful examination of this will show the opening of the fistula. In the sub-

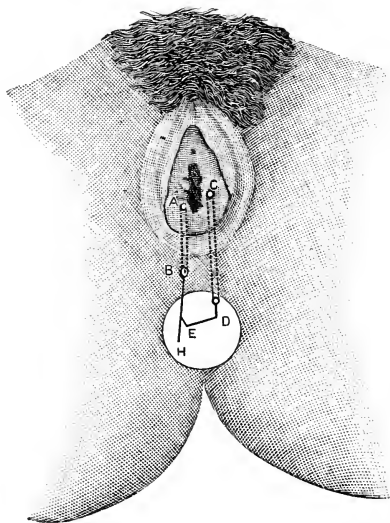


FIG. 8.

mucous variety there is little or no induration, while in the submucous the induration is likely to be distinct.

This variety of fistula is not, in my experience, very uncommon. It may arise from an abscess which has pointed into the rectum and not on the skin, or it may be due to an inflammatory or ulcerative process commencing in the rectal wall and resulting in perforation, such as tubercular disease. It is sometimes caused by inflammation of an internal hæmorrhoid, and I have seen several cases directly and unmistakably due to the injection of carbolic acid into hæmorrhoids.

The acid not infrequently sets up a circumscribed inflammation, which results in a small abscess breaking on the mucous surface, and burrowing under the mucous membrane if it has been deposited directly under the surface, or under the muscular coat if it has been more deeply placed. The fistulæ are generally not very extensive, the track being an inch or so long and generally single, unless more than one injection has been followed by the same result. In a feeble patient with phthisis and relaxed fibre I have seen the mucous membrane undermined in almost every direction as a result of a course of treatment with injections of 33-per-cent. acid; and in a patient of different fibre I have seen a

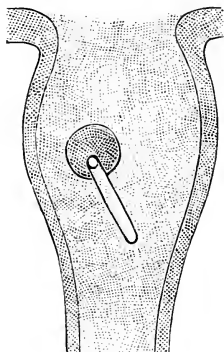


FIG. 9.

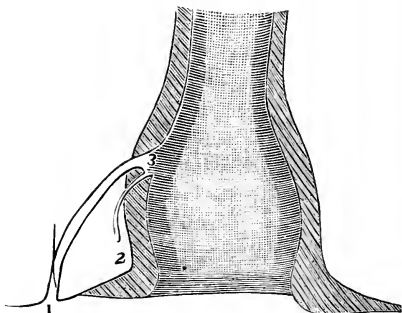


FIG. 10.

large abscess of the ischio-rectal fossa, with brawny swelling of the buttock, bursting high up in the rectum, following an injection of the pure acid.

The larger the abscess and the larger the opening into the rectum—it is sometimes so large that the end of the finger will pass into it—the easier the diagnosis. It is only the lesser forms of the disease that are liable to be overlooked, and yet even the lesser ones may render a patient's life very miserable.

There are two other points in the diagnosis of this affection that may be useful. One is, that the internal orifice when small may sometimes be detected by gentle pressure on the adjacent parts, which will force a drop of clear pus out of it; the other is, that in cases of circumscribed ulcer which refuse to heal under

treatment a blind track leading from the base of the ulcer should always be carefully searched for.

The treatment is simple in theory, but sometimes difficult to carry out. Large abscesses of the superior pelvi-rectal space which have opened into the rectum should be treated by the introduction of drainage-tube and daily washing out with boracic-acid solution. Those located in the ischio-rectal fossa should be opened on the skin, thoroughly cleaned out, and treated by drainage and injections to give the internal opening a chance to close without dividing the tissue between the two openings, which is often considerable. Should this fail the ordinary operation may be done. In the lesser cases of small tracks without abscess-cavity the track must be laid open. The rule is to enter a director at the opening into the bowel, bend it so as to follow the track, and then lay the latter open by cutting. When the track runs upward, as in Fig. 9—which, by the way, was a case due to carbolic acid, which attracted considerable attention before the cause of the patient's suffering was discovered—this is not difficult, but when it runs toward the skin and both opening and track are small, as in Fig. 10, it is a very difficult and uncertain proceeding. Where the induration approaches near enough to the surface to be easily felt, I have in some cases cut directly down upon this through the skin without any director, and have then found no difficulty in passing a director onward through the internal opening. If, however, there is no friendly induration to guide the knife, the track must be carefully dissected out from the internal opening. It is easy under these circumstances to make a false passage with the director and thus lose the true one, and fail, in spite of free cutting, to cure the case.

In the case pictured in Fig. 10 I found it nearly impossible to follow the track with a bent probe, the opening being a considerable distance from the anus, but it was finally satisfactorily laid open with the curved knife shown in Fig. 11. These are operations requiring patience and care, but with the rectum well exposed, under ether, there need be no difficulty. The knife of my own invention (Fig. 12) is sometimes very useful in these cases.

In fistulæ with very long and deep tracks, or in those with many smaller ones, a cure without an amount of cutting which shall necessarily lead to incontinence may be impossible. Fig. 13 is

taken from a case of the latter variety, where the openings and tracks were so numerous and the patient's general condition so bad that a cure was for some time despaired of. By several operations, however, undertaken at intervals, they were all finally laid open and cured with the result shown.

In these cases care must be exercised not to overtax the strength of the patient by too much cutting at any one time. The tracks can often be divided into two or three main ones, each with secondary side-tracks, and it is better to attack one main track and its branches at a sitting, leaving the others till the patient has gained strength by change of air and appropriate treatment.

In the cases of a single but very long and deep track it may not be best to divide everything at a single sitting, as, for example, where one opening is high up in the rectum and the other in the middle of the thigh. The question as to how much it is safe to do at one time must depend in great measure upon the strength of the patient; and it is often better to begin at the external opening and follow the fistula up to the buttock at one operation, leaving the remainder for treatment by injections or subsequent cutting.

In these deep tracks a galvano-cautery knife or wire may be better than a bistoury. A very strong knife



FIG. 11.



FIG. 12.

may easily be broken in such a case as is shown in Fig. 14. The external opening here was over the great trochanter, and the case was very naturally mistaken for hip-joint disease by several operators. The track had been laid open under this impression several times, but never induced to heal. It finally came under the care of H. M. Lewis, of Brooklyn, who succeeded in passing a probe into the gut, but the knife broke in the callous tissue. An *écraseur*

was next used, with the strongest picture-cord doubled, and this was broken. Finally the ingenious idea occurred to the operator of passing a chain-saw, and by this means the cicatricial tissue was finally divided and the patient cured.

The cause of incontinence after operation for fistula has been the subject of considerable argument, for in some cases a single incision through the external sphincter has been followed by this untoward accident, while in others very extensive and numerous incisions have left the patient still with good control. Smith

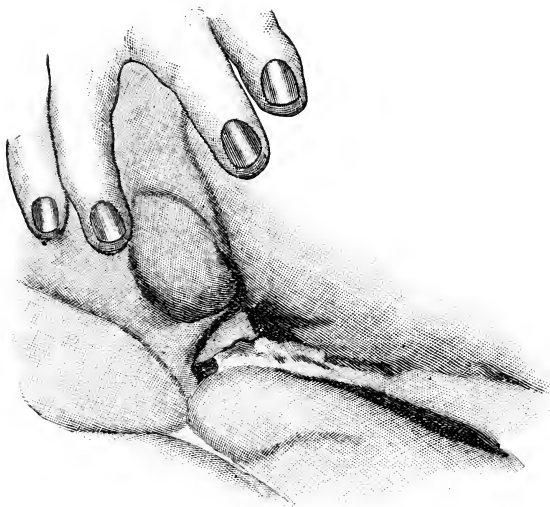


FIG. 13.

believes it to be due not so much to the division of the sphincters as to the division of the circular muscular fibres of the lower part of the rectum ; while Esmarch holds rather to the theory that it is due to division of the nerves supplying the muscle more than to the division of muscular fibres.

In my own mind the explanation lies in the fact of vicious cicatrization, by which the ends of the divided muscles are not brought into apposition in healing. On this supposition it is easy to understand why a single cut may result in loss of muscular power, the ends of the sphincter being separated by an interval of

half an inch, and the muscle therefore having no fixed point of support, while in other cases several incisions which have healed properly may still leave the segments of the muscle in shape to act as one undivided circle. The simplest form of the same condition is seen in lacerated perinaeum in the female. Here a single rent is followed by almost complete incontinence, and although the perinaeum may be perfectly restored by operation there will be no return of sphincteric power till the cut and separated ends of the muscles are brought into apposition.

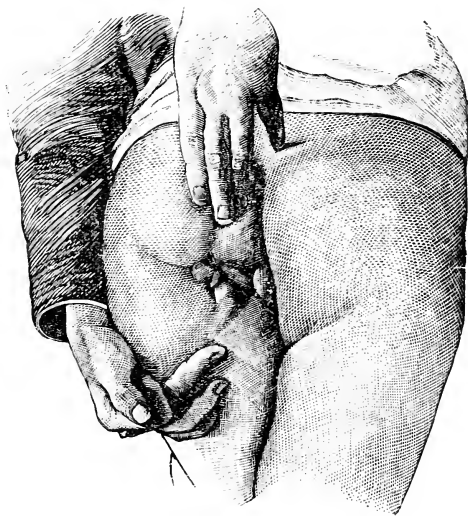


FIG. 14.

The condition is one which entails a greater or lesser degree of misery, depending upon the consistency of the faeces and the regularity with which they are voided. To a man who has one solid, natural evacuation before going from his house in the morning there may be no suffering and little annoyance, except what arises from the involuntary escape of wind and the soiling of the person with the natural mucous secretion of the bowel. The fact of inability to control the passage does not necessarily imply that the passages escape in a way to cause annoyance, for when they are of natural consistence and passed with regularity there is generally

sufficient warning to allow the patient to seek the closet, which he has learned never to be far away from at a certain hour. The greatest suffering comes in women when the bowels are loose; then there is absolutely no chance to avoid the consequences; a napkin is constantly worn, and the patient soon becomes a confirmed invalid.

If the anus be open and patulous, more or less prolapsus may follow; and this is a fresh cause of tenesmus and discharge, complicating and increasing the original trouble. The train of nervous symptoms following this condition is often in itself serious, and apparently out of proportion to the physical disability.

In the treatment of this condition the operator has an ample

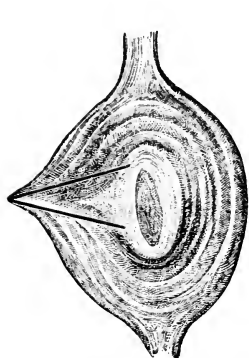


FIG. 15.

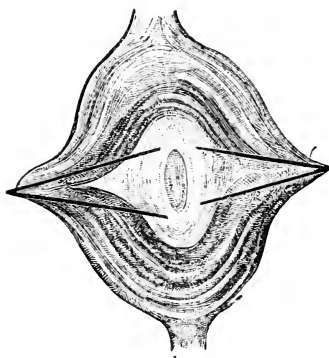


FIG. 16.

field for the exercise of all his ingenuity, for no two cases will be found exactly alike, and the operations must vary accordingly.

Some will be seen at a glance to be manifestly incurable, such, for example, as the one shown in Fig. 13, where the sphincters have been cut again and again in different directions, till the anus has lost entirely its original shape and it would be difficult to find any trace of the sphincter by the most careful dissection. Most cases, however, are amenable to operation and relief, and a successful operation brings much sincere gratitude to the operator.

There are two guiding principles in operating. The first is, to find the ends of the sphincter and unite them by suture; the second is applicable where the first is impossible, and consists in

producing an artificial tightening and closure of the anus, without much regard to sphincteric action.

The first indication may often be followed out at the time of the original operation for fistula, and is, in fact, done in the operation for immediate closure of the incision by suture of the wound, under antiseptic precautions. In extensive tracks and abscess-cavities the operation may fail, but in single deep cuts it often succeeds, and it is always worthy of trial with the object of obtaining direct and immediate union of the ends of the muscle and avoiding possible incontinence.

In cases such as are shown in Figs. 15 and 16 the operation



FIG. 17.

is the same as in lacerated perinæum—cutting down upon the ends of the muscle, freshening the edges of the original incision, and bringing them together with wire or catgut sutures.

In a case such as is shown in Fig. 17 the operation is much more complicated. This patient, in spite of all the cutting which had been done, was still suffering from a blind, internal fistula when he came under my care. In the figure the parts are not at all stretched open. The anus is seen as an irregular circle composed of cicatricial tissue, which held it wide open. The cicatrix extended an inch and a half into the rectum on all sides, and no mucous membrane was seen till beyond this

point. The anus and lower part of the rectum presented an open tube about an inch in diameter, entirely without any power of muscular contraction. At the point where the folds of mucous membrane first appeared there was an opening leading into a deep sinus in the right buttock, and this was opened up, relieving the patient of the pain and purulent discharge from which he suffered.

Even in this case, with anus and lower part of rectum converted into an open, unyielding tube, the patient did not complain of incontinence, though there could have been no action of either

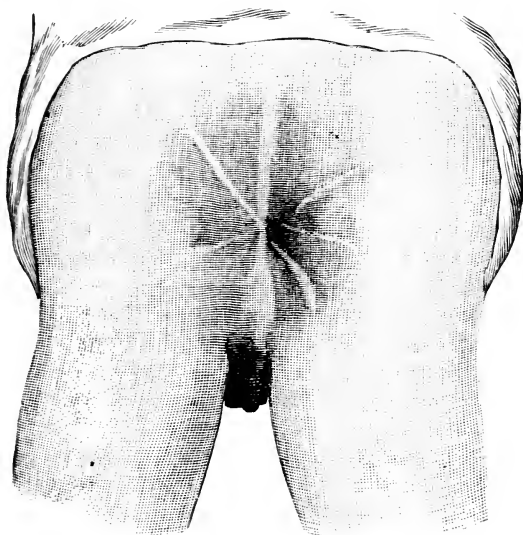


FIG. 18.

sphincters or levator, and hence no control. He simply had a natural passage every morning, and was never subject to diarrhœa.

In such a case the anus could only be closed by a plastic operation. The plan I proposed was to dissect the mucous membrane loose, draw it down, and stitch it to the skin, after freshening the cicatricial ring of the anus, so as to first give a mucous lining to the parts; then, by a subsequent plastic operation, or perhaps by the cantery-iron, to close the outlet of the canal. But after the fistula was cured, the patient, suffering really no inconvenience, declined further operation. The case proves better than any I have

ever seen that loss of sphincteric power is not always attended by any inconvenience.

In the second edition of my work on the rectum I described and figured the other operation to which I have referred for tightening the anus. Fig. 18 shows the cicatrix and the burnings made by the actual cautery for its relief. In tightening the anus, it is drawn to one side of the median line. In this way the orifice is simply rendered smaller, and the muscles have more chance to close it. The levator ani, the internal and what remains of the external sphincters, by combined action will compress, and, in a measure, close an orifice which has thus been artificially strictured to an extent sufficient to prevent the escape of feces under most circumstances, though of true sphincteric action of the external muscle there is very little. The operation, however, is capable of giving great relief.

There is another point which may, perhaps, be touched upon with advantage. In the great majority of fistulæ there is an internal opening into the rectum, but there are many exceptions to this rule, and these must be taken into consideration in operating. For example, the young operator passes a stiff, blunt director into the external opening, and feels for its end in the rectum, but cannot find it. Believing there must be an internal opening, he probes carefully for a few moments, and then begins to use force. After a time the end is felt just outside the wall of the bowel and is pushed through and brought out at the anus, and the incision is made; but it is easy to see that in only a very small proportion of cases can such an incision follow the fistula. In most cases a false track has been made, and in many the sphincters have been unnecessarily divided.

The rule, I think, should be this: Begin the dissection at the external opening and follow the track along inch by inch. If it lead into the rectum there will be no difficulty in finding the opening, and then the sphincter may be cut. If it lead away from the rectum there can be no justification for forcing the incision into the rectum. Sometimes it will be found that the track leads close up to the rectal wall, but the exact point of perforation, if there be any, may not be found. In such cases it is better to make an opening into the bowel and divide the sphincter; for where nothing but rectal wall and perhaps mucous membrane intervenes

between the fistula and the cavity of the bowel a perforation will probably take place after the operation, even if it does not exist at the time.

Schuchardt⁴⁰⁴_{N. 256} calls attention to the well-known relation between consumption and fistula and to the proof that the majority of fistulæ are due to local tuberculosis. To Volkmann belongs the credit of having first shown the tubercular nature of these fistulæ, and in the clinic at Halle in all these cases the presence of tubercular bacilli is shown by microscopic examination or by inoculation into the anterior eye-chambers of rabbits. Very interesting and demonstrative of the specific character of the disease is the well-known case of Volkmann, in which the secretion from the fistula infected the skin of the anus, giving rise to a *lupus foliaceous*, and it is at the same time a proof that lupus is a tuberculosis of the skin. In this case the inguinal glands also became tubercular. The secondary lupus occasioned the tubercular bubo in the same way that the inguinal glands are affected in cancer of the rectum, only by the encroachment of the carcinoma on the skin.

As to the pathogenesis of tubercular fistulæ, very small lesions of the mucous membrane afford the point of entrance to the tubercular virus, and it is characteristic that these small lesions of the gut must be present so that the virus imported in food or in the swallowed saliva may find its way into the loose periproctal connective tissue. Large ulcerations, such as also occur in intestinal tuberculosis in the rectum, only very seldom give rise to tubercular periproctitis. Only in isolated cases in which no opening in the mucous membrane can be found is a primary connective-tissue tuberculosis to be thought of. The rectum, like the cæcum and vermiform appendix, is very liable to acute inflammation and to chronic ulceration from stagnation, etc., of the bowel-contents, and, to complete the analogy, perityphlitic abscesses are seen having the character of tubercular abscesses.

The propriety of the removal of tubercular fistulæ has long been proved. The old idea that the fistula represented a beneficial, natural, derivative action, which hindered the development of the lung disease, and that the cure of the fistula caused the development of the phthisis, was proved false when investigation showed both diseases to be due to a common cause. A local tuberculosis should be removed whenever possible, and this applies

also to the rectum. The disease should be removed as radically as possible by incision and thorough scraping.

STRICTURE.

Bryant,⁶_{Jan. 5} has added what he considers a valuable help to the diagnosis of stricture above the limit of digital examination—a condition which he describes as “ballooning of the rectum.” When the stricture is low down and within reach of the finger this symptom does not exist, though its counterpart, a patulous condition of the anus, may exist. The rectum in its normal condition is a collapsible tube, and when the surgeon introduces his finger into this tube in its healthy state he finds the walls in contact, and these he has to separate to complete the examination. When a stricture of the rectum exists this condition does not always hold, and the surgeon will often find, when his finger has passed the sphincters, that he has entered a cavity the walls of which are expanded or “ballooned.” In this cavity the surgeon will be able to move his finger freely, and the walls will only be felt when searched for. When this condition is discovered the surgeon will be justified in more than suspecting the existence of stricture, for Bryant has never found this ballooning to be present under other conditions than stricture, and the observation holds good in all cases of obstruction beyond the reach of the finger. He believes the condition to be due primarily to the atrophy brought about by the arrest of all peristaltic action from above the seat of obstruction; and secondarily, to the distention of the atrophied bowel by retained flatus. It is not met with in all cases of stricture, and particularly those of rapid formation. It is, however, as a rule, present in cases of chronic stricture, and should be looked upon as a characteristic symptom.

While admitting the existence of the condition referred to in some cases of stricture, I think I have seen the same thing in cases where no stricture existed—cases of simple atony of the rectum.

CANCER.

Of the many interesting points brought out by Mr. Jessop at the last annual meeting of the British Medical Association²_{Aug. 24 et seq.} I can only call attention to a few. Speaking of the frequency with which complete obstruction occurs, he finds that in 102 cases where the course of the disease was not interfered with in his own practice,

less than 1 in 3 died from this complication. He calls attention to the fact that where the disease is low down in the rectum complete obstruction seldom occurs, and that the opposite is true where the disease is high up. The reasons for this difference are to be found in the anatomy of the parts; for, whereas the rectum as it approaches the outlet becomes more closely applied in the sacrum and pelvic wall, in its superior portions it is comparatively free, and thus the contractile action of the colon above is exerted with effect in forcing the contents through a contracted ring when that ring is fixed and immovable; whereas, when the narrow portion is free, movable, and not attached, as it is when situated in the upper part of the rectum, the efforts of the bowel above succeed only in invaginating or otherwise displacing the growth, and fail altogether in effecting any onward movement of the contents.

Considering the effect of colotomy in prolonging life in cases in which extirpation is not done, and in which from the location of the disease near the anus fatal obstruction is not likely to occur, he says in order to answer this question he has made inquiry into the life-history of 86 patients, of whom 52 ran their course without operation, and 34 submitted at some stage or other of their disease to left lumbar colotomy. In this inquiry he has taken care to exclude all doubtful cases, and has limited it to such in his own practice as have within recent years come under his own personal observation, in order, as far as possible, to exclude elements of uncertainty. The average duration of life in those who were not operated on, reckoning from the date of their earliest symptoms complained of, was a little over seventeen months, whilst that of the 34 who underwent colotomy was twenty-two and a half months. This gives an average extension of life of five and a half months.

As to how far the patient's physical condition is improved and his suffering alleviated by the operation he says: "The conclusions I have been able to draw are that by its means the continuous pain is lessened in severity; the desire to evacuate, almost constant and very distressing where no operation is performed, disappears in some and is lessened in others; incontinence of feces, a frequent source of anguish, though occasionally met with, is usually absent. Finally, the motions are not only discharged with comparative ease, but in the majority are reduced at the most to one in two or three hours.

Cripps, in the discussion which followed the article by Jessop, gave his own experience with his 30 excisions. Of these 2 died, one of erysipelas on the twelfth day, and the other, aged 76, of exhaustion on the twenty-third day. Of the 28 which recovered the subsequent history is as follows: In 6 no reliable information; in 10 there was recurrence within one year; in 4 recurrence between the first and third year; 1 died without recurrence one year after operation; in 1 there was no recurrence after eighteen months and the patient was then lost to sight; in 6 no recurrence at the time of writing (1 three months; 2 nearly two years; 1 three years; 1 four years, probably eight; 1 nine years).

The results cannot be said to be brilliant, but when we consider the character of the disease, and know by experience that no other form of treatment affords the slightest hope of cure, they are by no means discouraging. He believes that a cure is effected in from 10 to 15 per cent. of the cases operated upon.

The weight of opinion was decidedly in favor of limiting the operation to cases of circumscribed disease easily reached.

Levy³³⁶_{Mar. 30} has worked out on the cadaver a method of resection of the upper part of the rectum, which he thinks preferable to that of Kraske in that it leaves the floor of the pelvis almost intact. The first incision is made horizontally across the sacrum, about one-half inch above the cornua coccygia. This should be from 4 to 4½ inches long and should extend to the bone. From the two ends of this cut two cuts are made downward, about 4 inches, through the entire thickness of the gluteus maximus. In one of these vertical incisions a bent hook is inserted and the soft tissues pulled well outward. The lateral portion of the posterior sacro-sciatic ligament is thus laid bare, and both the posterior and anterior sacro-sciatic ligaments are divided close to the edge of the bone, in the line of the horizontal incision. The same thing is then done on the opposite side, and by means of an elevator the connective tissue on the anterior wall of the sacrum is freed. The skin flap, with the bone attached, is then turned down by a strong hook, and a large portion of the rectum is brought into view. Through this opening, after the connective tissue has been separated, one is able to reach downward to within three-quarters of an inch of the sphincter and upward to the sigmoid flexure. If it be necessary to cut away still more of the sacrum it can easily

be done. After resecting the bowel the ends are united by a double row of catgut sutures, the flap is brought back to its original position, the excised portion of the sacrum brought into place by bone-suturing, and the horizontal incision closed. The perpendicular incisions may either be packed with iodoform gauze or else closed, except at their lower extremities, which should be left open for drainage. This operation is based on the fact that, as the floor of the pelvis is left intact, neither incontinence nor prolapse is apt to follow the resection.

Ullman¹¹³_{June 16} has shown that in certain cases of cancer unsuitable for aspiration an anastomosis may be made between the gut above the disease and that between the lower end of the growth and the anus, by means of Kraske's incision. The ends are not approximated laterally, as in Semm's method, but are stitched to each other, as in ordinary resection. He prefers this procedure in some cases to the alternative of colotomy.

Albert⁸_{June 27} also has greatly extended the field of Kraske's operation by adapting it to all kinds of affections of the uterus, to prolapsus, and to pelvic surgery generally, as well as to congenital malformations of the rectum.

COLOTOMY.

Allingham, Jr.,²_{Apr. 27 et seq.} has started a discussion as to the proper means of avoiding undue protrusion of the gut after colotomy, especially inguinal. He concludes (though by no means proves) that it is due to a lengthened mesentery, and he therefore in his first operation draws out all the gut and attached mesentery possible and fastens it into the wound. From one to three days later he amputates all of this outlying gut with its mesentery—the former reaching sometimes six or twelve inches in length. The exact method of performing the operation cannot be gleaned from his indefinite description, but it strikes me much as it seems to do Cripps, who says: "I am not quite clear as to the details of Allingham's panacea, but if it includes the cutting off of a foot or so of bowel I regard such a proceeding as surgically unsound because unnecessary, and as adding an appreciable risk to the operation."

The inguinal operation seems constantly growing in favor, and no important changes have been made in its technique. The formation of as sharp a spur as possible by drawing the whole

calibre of the gut out of the wound and fastening it there is insisted upon. I have recently called attention to a simple device which is proving very satisfactory in my own practice. It consists in passing a hair-lip pin under the gut and through skin and peritoneum on each side, and leaving it in place for two or three days until firm union has had time to occur.

COLECTOMY.

Kendal Franks⁶_{Mar. 2} related at a meeting of the Royal Medical and Chirurgical Society 2 cases of colectomy for malignant disease, and from 51 cases collected by him drew the following conclusions:—

1. The operation rarely effected a cure.
2. As a palliative measure it was justifiable and frequently demanded.
3. Recurrence generally took place in the liver or mesenteric glands, and gave an easier death.
4. The mortality after immediate suture of the gut, and after the formation of an artificial anus, is nearly the same.
5. Immediate suture is preferable to the formation of an artificial anus.
6. The death-rate has been reduced in the later cases, and a further reduction may be anticipated.

In the discussion following the paper, Bryant said his first impressions on reviewing the whole number of cases were against the operation. In malignant disease of the lower bowel we had to choose between colotomy, colectomy, and tiding the patient down hill, and he thought the conclusion was in favor of colotomy, which gave comfort to the patient, prolonged life, and gave all the benefit colectomy seemed to do. On looking over the table it appeared that only 1 of the 51 cases was cured; there were direct failures in 40 per cent., and indirect failures in the others. The operation was therefore dangerous and could not be recommended.

Treves also spoke to the same effect. The operation was only palliative. But 1 case of the series presented no recurrence after four years; and yet cases of cancer which had been colotomized commonly lived three or four years. For six years he had not seen a case in which he would have dreamt of removing the colon for malignant disease. There was a remarkable difficulty in uniting certain parts of the colon. The transverse part and the sigmoid, being covered by peritoneum, were easy, but in the cæcum it was almost impossible, the non-peritoneal surfaces declining to heal, and in many cases an abscess formed outside the gut.

SURGICAL DISEASES OF THE GENITO-URINARY APPARATUS IN THE MALE.

BY E. L. KEYES, M.D.,

NEW YORK.

THE journals of 1889 furnish abundant evidence of continued activity in the line of genito-urinary surgery in all parts of the world—interesting, however, mainly in points of minor detail. There has been presented no startling novelty, no point of general new departure. The amount of material has been excessive, and I have endeavored to select judiciously. Many admirable papers are not alluded to because, although their presentation of the subject is perfect, yet they do not touch mooted points, advance any novelty, and cannot in the sense of this digest be classed as news. Much relating to the high operation upon the bladder, to kidney surgery, and to stone is in this way omitted.

The usual number of articles have appeared dealing with phimosis, the various alleged reflexes, and their relief by ablation of the foreskin, some unimportant new operative methods, and some new alleged cases of tubercular infection, ascribed to suction as used in connection with the religious rite.

DISEASES OF THE PENIS.

Dislocation.—A. P. Hill, of Viola, Tenn., ¹²⁰_{Oct.} gives the case of a negro boy of 13, who was caught in a hay-rake and the scrotum and perinæum considerably lacerated, while the penis was dislocated under the integument of the abdomen in the line of the linea alba. The dislocation was at first overlooked because the sheath of the penis appeared normal; but, when retention came on, search for the penis showed that the skin formed an empty sheath and that the organ was nowhere to be found. It was easily recovered, however, by splitting up the cutaneous remains of the sheath of the penis and fishing it down with the hooked finger from its unusual position under the abdominal integument.

Epithelioma.—An exceptionally good sequence of operation comes from the pen of Polaillon and Dubuc, ²⁶⁶_{Jan.} who report the case of a man of 54, whose epithelioma had destroyed the penis, involved the subcutaneous tissue over the symphysis, and implicated both cords. The entire external genitals, the mons veneris, the scrotum, and testicles were removed, mainly by thermo-cautery, the urethra being cut off in the perinæum. When inspected, nine months later, there had been no relapse.

• DISEASES OF THE TESTICLES.

Misplaced Testicle.—The question of the proper management of misplaced testicle is not yet entirely agreed upon. Therefore the successful case recorded by Edmund Owen, of London, ⁶_{Feb. 2} is worthy of record. He replaced a testicle by incision through the scrotum and liberation from the perinæum, where it was lodged, and retained it by passing a deep suture through the scrotum from one side to the other behind the testicle. The difficulty has often been that the testicle slips out of its position when replaced. Owen recalls the earlier cases of replacement by Flanagan, Curling, and Adams, which were failures, and of Marshall and Annandale, which were successful. The latter sutured the replaced testicle to the bottom of the scrotum with catgut.

Hydrocele occupies the attention of surgeons in all parts of the world, more or less, in regard to the value, relatively, of injections of carbolic acid and tincture of iodine as compared with the more radical removal of the tunica vaginalis. Pure surgeons, as a rule, prefer the latter curative method. Brigade-Surgeon Sibthorpe ²⁶⁶_{Feb.} reports 14 cases in which radical cure was attempted, by injection in 10 of pure tincture of iodine, and in 4 of pure carbolic acid. He thinks there is little choice between the two as to efficacy, although he admits that carbolic acid is less painful.

Helferich, of Griefswald, ¹¹⁶_{Mar.} has tested carbolic acid injections by Levis's method in over 30 cases, with known results in 27, cure in 21, relapse in 6, all of which latter were cured by a new injection except one. In one case, of hæmorrhagic diathesis, there were serious symptoms from swelling of the scrotum with blood, calling for the radical incision. (The testicle was taken away at the same time, but why it is not stated.)

Levis ⁶_{May 1} claims to have used his method of carbolic acid

injections for ten years with uniformly good results. I have also employed carbolic acid uniformly in all cases of uncomplicated hydrocele and in a few that were complicated, since reading Levis's article, and have yet to note a failure. My method is somewhat different in detail and seems to be simpler than Levis's, but the results are equally satisfactory.

Nancrede, of Philadelphia, ⁹_{May 18} has reported 2 cases, one personal case and one of Barton's, in which, after failure of cure by iodine injection, incision was practiced and loose bodies found in the tunica vaginalis. He suggests that these bodies may be the cause of failure of radical cure by injections more often than is commonly supposed.

Hertzberg's attempt ^{761:80}_{Feb. 15} to prove by Brun's operations that excision of hydrocele is a method of cure superior to injections seems amusing. Forty-six cases are recorded, in 8 of which there was severe general reaction, prolonged fever etc., and it is stated that the average stay in hospital was sixteen days, and that there were two relapses. The surgeon familiar with the usually delightful results of the pure carbolic acid injection treatment must feel inclined to smile at least. In the last dozen or more operations that I have performed with pure acid, through hypodermic needle puncture, the patient has never remained in bed over a couple of days; most have not gone to bed at all. Three have been done in my office, and in one the patient has driven home in a carriage. One went home from the office to a town thirty miles away in a neighboring State (he was a case of relapse after iodine injection). All were radically cured. Hertzberg allows 3 or 4 per cent. of relapse after incision, and claims 8 per cent. of relapse after iodine injections. It seems to me that there is still ground for improvement in the deductions that he draws, if he is willing to review the subject.

In the matter of *varicocele*, Horteloup is recorded by E. Hart ²_{Mar.}, as advocating seizure with curved forceps of the cluster of varicose veins in the scrotum, and excising them in mass with a considerable portion of scrotal tissue (laterally), and then uniting the scrotal edges.

Paul Segond ²⁶⁶_{Apr.} comes out in favor of the old Astley Cooper method of cure, by excision of redundant scrotal tissues, and cites Reclus in indorsement. He details 4 cases from his private practice. Doubtless this method is admissible in selected cases, but

that it avails always, and can be depended upon invariably, I think has been disproved by those who have seen relapses follow its use.

The usual tendency to generalize, from the fact that varicocele exists, and because other things occurring at the same time the other things are ascribable to the varicocele, is again brought forward by 2 cases. Jamin²⁶⁶_{July} reports *in extenso* a case of congenital impotence which certainly was associated with varicocele and appeared to be due to it, and undoubtedly disappeared after the varicocele had been cured by radical operation. The trouble arising from cases of this sort is obvious. If impotence happens to be cured by operation upon varicocele, then any patient may be promised a cure for impotence if his varicocele is operated upon. The disappointment that will follow such a promise usually is certain.

The other condition cured by the radical operation upon varicocele is one of satyriasis, by Geo. T. Welsh.⁵⁹_{Aug. 17} The possibility of the coincidence of some neurotic condition with varicocele and the disappearance of the former after cure of the latter is quite natural, without justifying one in accepting the sequential coincidence as proper ground for generalization.

Tubercular Disease.—A number of articles from various sources go to show a continuance of the difference of opinion as to the necessity for and the value of extirpation of the tubercular testicles. The most outspoken opinion, as usual, against ablation of the testicle is by Verneuil,²⁶ who repeats the assertion already made by him elsewhere that the removal of one testicle for tubercular disease gives an impetus to the malady in other organs. He therefore extirpates only in the most advanced stages, preferring interstitial cauterization for conditions of moderate local change. Some new material regarding tubercular testicle in infants has appeared from the pen of H. Koplik, of New York.⁵¹_{Oct. 12} It appears that the author has found only 12 cases of tubercular testis in children in the literature of the subject from the first month to the third year. The epididymis in these cases was sometimes primarily diseased, in others the testis. In one case general tuberculosis followed, in another cerebral tumor. The author adds a fresh case and advocates early extirpation. On the other hand, L. Jullien,³_{Oct. 16} in a report of a communication to the French Surgical Congress,

speaks of 17 cases of tubercular disease of the testis seen in the service of Lannelongue among 5366 cases examined. He thinks that the malady is much more common than is usually believed, that it never attacks an undescended testis, that it is always acute or subacute, quickly suppurates, and gets well after all the morbid focus is eliminated. The prognosis is good. He refers to a case in which total absorption of the testicle occurred without any external opening. The tubercular process first destroyed the testis, and then the tubercle itself was absorbed, leaving the patient a pathological monorchid.

DISEASES OF THE SEMINAL VESICLES.

Spontaneous Consecutive Suppuration.—Jordan Lloyd, of Birmingham, ²_{Apr. 20} details a case of spontaneous double consecutive suppuration of the seminal vesicles, cured in both instances, at an interval of about two weeks, by perineal puncture and drainage.

He recalls the case of Smith, of Baltimore, ⁶_{v. 2, p. 559, 72} of an enormous cyst of the seminal vesicle, filling the pelvis, wherein, after drawing an ounce (30 cub. cent.) of fluid from the bladder, the cyst was tapped through the rectum and 10 pints (5 litres) of a brown serous fluid evacuated. He refers also to a case described by Ralfe, ⁶_{v. 2, p. 752, 76} where, after death, a large cyst of the left seminal vesicle was found filling the pelvis. The symptoms in this case had existed for five months.

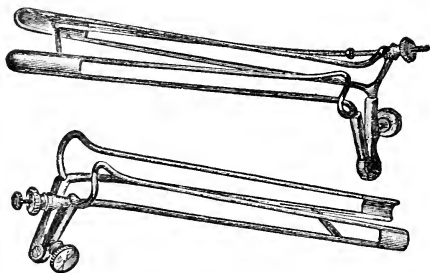
Abscess.—Another post-mortem case is that of Mitchell Henry, ¹⁰⁰⁷_{v. 33, p. 397} of peritonitis following a large abscess of the left seminal vesicle. The bladder had been perforated by an ulcer. The patient had never had gonorrhœa or syphilis. Lloyd records another case in which he diagnosticated acute abscess of the seminal vesicle, relieved it by aspiration through the rectum, and verified his diagnosis by a microscopic examination, finding in the fluid large, roundish, opaque bodies and numerous motionless spermatozoa. Lloyd closes with some very rational conclusions, the most practical of which is that in cases of suppuration it is better to evacuate the abscess by perineal incision.

DISEASES OF THE URETHRA.

Double Urethra.—J. English ^{113 326}_{Nos. 27, 28, '83; No. 42, '88} makes three varieties in classifying double urethra: 1. Perfect double urethra, with

two separate vesical openings. Only three or four such cases have been observed—all with double penis. 2. Congenital dorsal fistula—an opening on the dorsum, near the corona glandis, or near the symphysis, communicating with a second canal which extends to somewhere beneath the symphysis pubis and ends in a blind pouch. Six such cases are on record, and English adds a seventh, in which the abnormal canal was in a state of gonorrhœal inflammation, the true urethra not being involved. 3. This is an abnormally widened lacuna, making a canal parallel to the urethra in its front portion. In a mild degree this is a very common abnormality.

Urethroscopy.—F. Tilden Brown, of New York, ²⁴⁵_{Mar.} offers a new urethra speculum, the advantages of which, as shown in



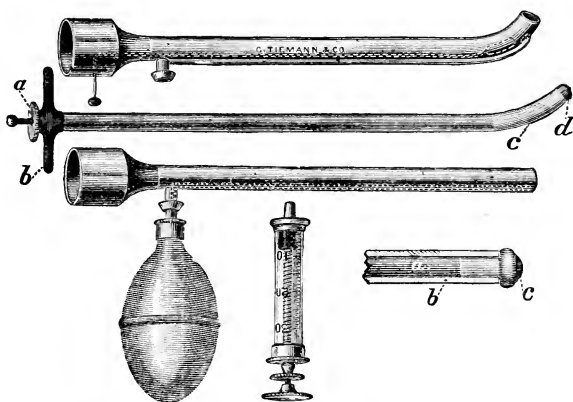
F. TILDEN BROWN'S URETHRAL SPECULUM.
(*Journal of Cutaneous and Genito-Urinary Diseases.*)

the figure, are that the blades may be so opened as to remain open throughout, or may be made to converge at either extremity. Its applicability in certain cases, where the short endoscopic tube would not do as well, is obvious.

The best novelty in urethroscopy seems this year to have emanated from W. K. Otis, ¹_{Apr. 18} of New York, who suggests some improvements in the tubes, which the figure illustrates. The bulb beneath the lower tube is for the purpose of doing away with the necessity of swabbing. An inner tube, so small as not to interfere materially with the lumen of the larger tube, may be attached to a bulb filled with fluid, and a compression of the latter throws out a little water and immediately sucks it back from the field of vision, thus washing off any obstructing blood or mucus. A hypodermic syringe attached to the same place may apply a few drops

of a medicated solution where it is desired. The curved tube is for use with a small mirror to reflect the roof of the curved urethra. The obturator has a soft-rubber end at *c* (the rest being vulcanized), so that a turn of the screw (*a*) causes the rubber to bulge over the sharp end of the metallic tube and thus facilitates introduction without friction. A similar bulging of the soft-rubber end of an obturator is represented by the lower right-hand figure.

Meatotomy.—On the question of meatotomy the article most worthy of record this year seems to be that of James C. Olmstead, of Atlanta,²⁰⁷ where, in a plea for the meatus urinarius, he again



OTIS'S URETHROSCOPE.
(*New York Medical Journal.*)

raises a timely voice against indiscriminate enlargement of this naturally narrow portion of the urethra.

Gonorrhœa.—As usual, this year again the gonococcus receives its full share of attention. Neisser, of Breslau,²² in a paper read at the recent Dermatological Congress, holds that the gonococcus is the specific cause of gonorrhœa. He thinks that the diplococci found in the healthy urethra by Lustgarten and Mannaberg differ in cultivation from true gonococci in that the latter require blood-serum for their development.

In reviewing a Nancy thesis E. Legrain²⁶⁶ gives a very complete exposition of the various associated microbes found in the urethra in healthy and diseased conditions, with plentiful reference

to authorities, and furnishes some excellent photographs of gonorrhœal pus containing gonococci, which are deserving of reproduction here. The upper figure shows a colony admirably displayed within the pus-corpuscle. The central figure shows a number of colonies developed in contiguous pus-cells. The lower figure shows a corpuscle which has burst, liberating the colony.

Diday and Doyon,²⁷¹_{Dec. 16, '88} writing about the gonococcus, recall and accept the conclusions of Steinschneider,⁴_{No. 17, '87} namely, that the urethra in the female is always involved at first in gonorrhœa; that the vagina is not a good field for the gonococci on account of the natural acidity of its secretion and the solidity of the epithelial lining; that long after the gonococci have disappeared from the urethral discharge in the female, they may still exist abundantly in the neck and within the body of the uterus, without any necessary inflammation of these parts. Finally, that the uterine neck is the principal seat of chronic blenorhagia. In this way the authors account for much of the spread of gonorrhœa which seems to have been derived from healthy women, and in which the cause of the disease is commonly ascribed to the fact that the male recipient has been overheated.

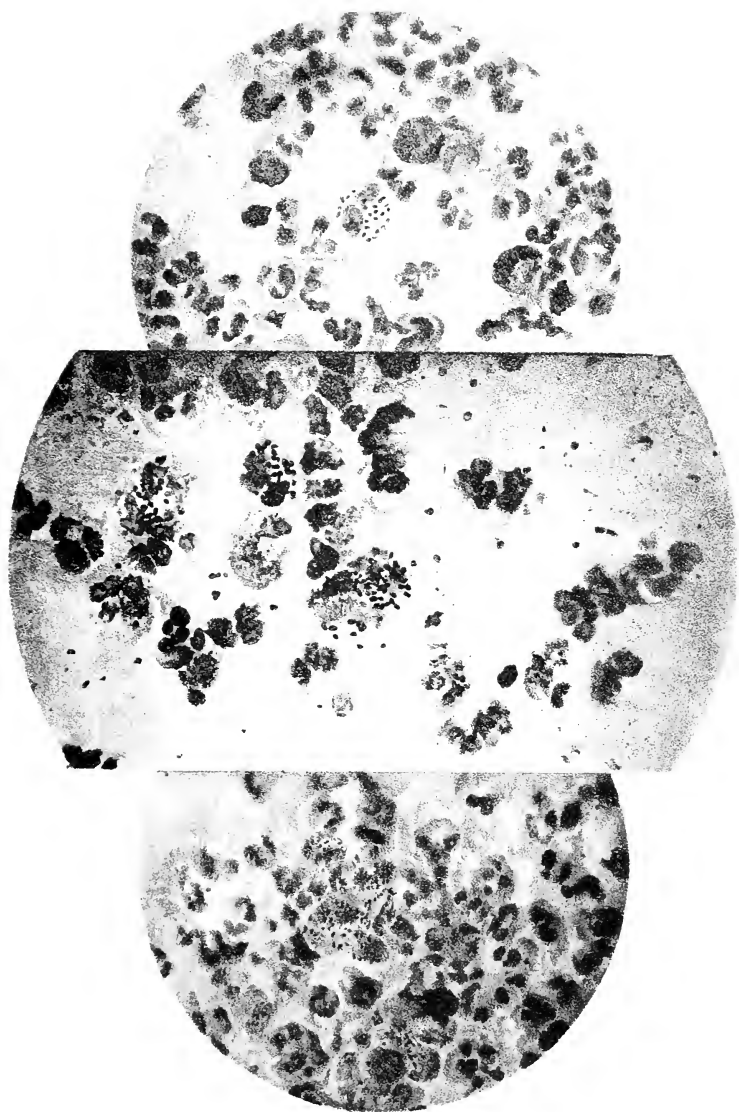
Rodait¹⁷_{May 2} takes for his text a case under Mauriac's care in the Midi Hospital, reported by Strauss—a boy who had true gonorrhœa with gonococci, which gonorrhœa, he stated, had come on after excessive masturbation, he asserting that he never had had intercourse with a woman—a statement “important, if true.” Rodait goes into an extended examination of the gonococcus and of the other numerous micro-organisms found in the urethral and in other secretions. Nothing practical can be deduced from this paper except, perhaps, Roux's plan for examining for the true gonococcus of Neisser in medico-legal cases. Reproduction of this finds a proper place here.

Roux's recommendation is the following: 1. Pus is prepared between two lamellæ, as usual, by pressure rather than friction. 2. The lamella, dried and passed through a flame, is placed face downward in the following bath:—

Aniline solution :	{	Aniline oil,	3 cub. cent. (M 48)	} 5 c. cm. (31½).
	{	Alcohol at 50 deg.,	7 “ (5 1½)	
	{	Water,	90 “ (3 3)	

Hydro-alcoholic solution of methyl blue, 10 drops.

After which the glass is left out two or three minutes in the cold;



Gonorrheal pus with gonococci (Legram).
Annales des Maladies des Organes Génito-Urinaires



then an examination is made. 3. Wash the cover-glass in water, and bathe for two minutes in Gram's liquid:—

Iodide of potassium,	. . . . .	2 grammes (30 grains).
Iodine,	. . . . .	1 gramme (15 ").
Distilled water,	. . . . .	100 grammes (3 fluid oz.).

4. Remove the excess of iodine and place the glass in absolute alcohol until there is complete discoloration. 5. Wash the glass in water and stir for two or three minutes in an aqueous concentrated solution of ordinary eosine. 6. Dehydrate clear with essence of girofleure and mount in balm of zylol.

These details may appear minute to those not familiar or acquainted with bacteriological work, but their execution does not take more than twenty-five minutes. After the action of the Gram solution and the eosine, the preparation takes a rosy tint, and the gonococci are discolored; the other microbes are colored more clearly. In legal medicine, the presence of the coccus of Neisser may perhaps require to be established. Roux's method gives the best results for the urethral pus of man. In women we meet with the gonococci, as well as a considerable number of other micro-organisms. Winter has described 37 varieties found in vaginal mucus. Search for the specific coccus must also be made in the clothing of the individual, as well as in the purulent secretion.

The usual number of sure cures from gonorrhœa have appeared this year, wearisome to read, and truly disheartening. It is painful to observe how many foolish things people will write, others publish, and doubtless others experiment with. He was a wise man who stated that curability of a disease might be estimated inversely as the number of drugs alleged to overcome it—instancing rheumatism. Except that he was generalizing for polite society, he might more appropriately have instanced gonorrhœa. It would be idle to enumerate the many prescriptions which the journals of this year afford. One curious means used as an adjuvant to treatment seems interesting enough to record. It is reported by Paul Dugloux.²⁴¹
Dec. 1, '88 A nervous youth had gonorrhœa. After the acute symptoms subsided he was ordered a sublimate injection, 10 centigrammes ($1\frac{1}{2}$ grains) in 200 grammes ($6\frac{3}{4}$ fluidounces) of water. One injection caused such violent pain, with spasm and syncopal tendencies, that the patient absolutely refused to make another. He was hypnotized, and it was "suggested" that he

should continue the injections, and that they would not pain him. He returned next day and stated that the idea had occurred to him to try his injections again, that he had done so, and that no pain had been caused. He was again hypnotized, and it was again suggested that he should continue his injections, that they would cure him and would cause him no pain. One more suggestive sitting was had, and thereafter the patient continued his injections without pain, and with the happy result of becoming well in a few weeks.

Alf. Poussin²⁶⁶ makes history repeat itself by claiming in nitrate of silver the abortive agent for gonorrhœa. He records 2 cases, one forty-eight hours after commencement of the discharge, which latter came on after seven days' incubation. He instilled into the anterior urethra a few drops of a solution of nitrate of silver, 1 to 30, and gave 4 capsules of sandal-wood oil three times a day, and twice a day allowed the patient to inject himself with a solution of 25 centigrammes (4 grains) of nitrate of silver, 15 drops of laudanum in 100 grammes ($3\frac{1}{8}$ fluidounces) of water. Cure occurred in three days. The second case had been discharging freely for a week, but got well in a week under the same treatment, and was happily married. Poussin has a good name, but these cases sound almost too good.

In the same line Diday²⁶⁷_{Jan. 25} records a case of cure by a patient who, on the second day of discharge, injected himself with a 10-per-cent. solution of nitrate of silver, thereby producing a high degree of inflammation, which ceased in three days and left him well. Diday uses for the abortive treatment a solution of nitrate of silver, 1 in 90, and speaks highly of it. Another case in "abortive treatment," which seems to possess the germ of suggestion at least, comes from the pen of J. Huguet,²⁶⁶_{May} who, theorizing that the reason why the abortive treatment of gonorrhœa was ineffective in most cases, must be sought for on anatomical grounds, and that the gonococcus having penetrated into the epithelial layer (and below it), the latter protected the parasite from the full action of the drug employed. On these grounds Huguet concluded to use a small bristle mop, such as is employed to clean pipe-stems, size No. 11, Charrière. He cocainized the urethra in 2 cases, mopped them thoroughly, and immediately injected a 1 in 1000 corrosive sublimate solution. Afterward 3 injections were

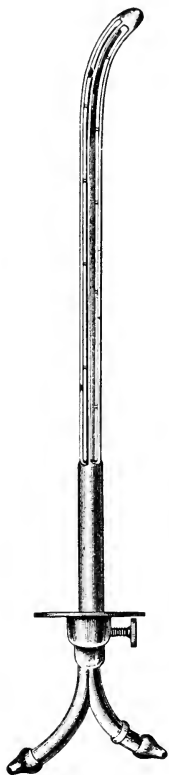
given a day, and a cure was reported in the 2 cases experimented on in ten and fourteen days respectively.

Zeisler's powder-packer⁵⁹_{Jan. 19} needs comment only to record the fact that it has not kept its promise, at least in New York, having been tried in a number of private cases and in dispensaries. It certainly is an instrument often producing great pain in its application, and not by any means so effective in controlling either acute or chronic urethral discharges as other remedies with which the profession is familiar.

The antrophore also calls for a word on this account. I stated last year in the ANNUAL that the German patent had been allowed to lapse. I am corrected by an American maker of this patented cure, who tells me that this is an inaccurate statement. I took it from an English journal and here withdraw it. My personal experience with the antrophore is that it is a routine method of treatment, not scientific, not applicable effectively in a majority of cases, not safe, and better dispensed with than used.

Alfred Lanz²⁸_{Jan. 15} has devised another instrument to effect irrigation of the deep urethra. A glance at the figure explains its mode of action. Lanz indorses its efficacy in a general way, but confesses that his trials have not been extended. That it will do what is expected mechanically—that is, carry an injection deeply and irrigate forward—is clear from a glance at the instrument. A similar urethral irrigator was devised by Zulzer sometime ago, and was reproduced in the first issue of the ANNUAL. Another similar instrument was described by Carl Schultze.²⁸_{Aug. 15, '88}

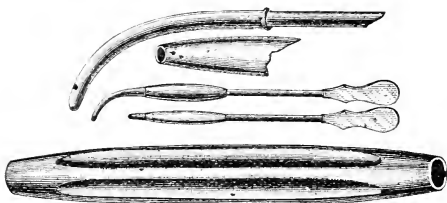
Treatment of chronic urethritis by ointments has long been in use in various ways. Generally a ribbed sound is used, sometimes the cupped sound; sometimes an ordinary sound is smeared



LANZ'S URETHRA IRRIGATOR.
(*Monatshefte für praktische Dermatologie.*)

with ointment. J. N. Rhodes, of Philadelphia, ⁹ June 22 has devised an instrument which he believes to be an improvement upon the ordinary grooved sound. It is a 3-inch (7.5 centimetres) bulb deeply grooved on four sides. Placed upon a slender sound, it acts as a bulb, distending the urethra moderately and detecting tender areas. Upon these he allows the bulb to rest for several minutes, makes his applications two or three times a week, and claims gratifying success by employing an ointment as follows: \mathcal{R} Argenti nitratis, 10 grains (0.7 gramme); Tr. benzoini co., 15 drops (1.0 gramme); Ung. petrolei, 1 ounce (29.5 grammes). The figure represents the instrument.

One of the medicated salves, spoken of sufficiently often to make it desirable that its composition should be generally known, is Unna's salve. Czadek, of Kiev. collaborator, speaks favor-



RHODES'S GROOVED SOUND.
(*Medical News.*)

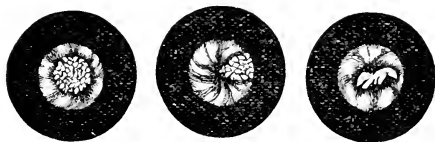
ably ²⁶ June of it, when spread upon Bénique tin bougies, for the treatment of inveterate gleet. Its composition is: Nitrate of silver, 1.0 part; yellow wax, 2.0 to 5.0 parts; balsam of Peru, 2.0 parts; cocoa-butter, 100 parts. He also thinks well of Sperling's ointment: Nitrate of silver, 0.1 to 0.3 part; white wax, 4.0 parts; lanoline, 20.0 parts. The bougie is left in place from three to twenty minutes.

Membranous Desquamative Urethritis.—Pajor, ⁴⁵ Feb. 16 reports two cases of this unusual malady, coming on, in both instances, without the intervention of sexual intercourse in persons who a considerable time previously had had gonorrhœa.

In both of them recovery occurred after the shedding of a cylindrical, fine, white, fibrous membrane. The membrane appeared in each instance to involve the entire length of the urethra. Strangury and local pain and burning, with sexual depression,

seemed to be the main symptoms. Treatment did not seem to modify the duration of the malady, which lasted a month in the first case and something more than five weeks in the second.

Papillomatous Urethritis.—F. M. Briggs, of Boston, ⁹⁹_{Oct. 24} reports a case of this disease, first clearly described by Oberländer, of which the adjoined cuts give an endoscopic view. Oberländer's method of raclage with tampons failed, but curetting—the curette being passed through an endoscopic tube and the racle done after the tube had been withdrawn—proved effective and entirely curative, with the subsequent assistance of a few injections of permanganate of potash. In this connection may be mentioned a new instrument for the purpose of removing small papillomatous growths from the urethra, designed by N. P. Fedtchenko and communicated by P. T. Diakonoff, corresponding editor. It consists of a double tube, one of which is a sort of an endoscope with



ENDOSCOPIC VIEW OF PAPILLOMATOUS URETHRITIS.
(*Boston Medical and Surgical Journal.*)

an eye in it, the internal one having another eye, the object being that the papillomatous growth may be entrapped in the eye of the outer tube and finally that of the internal tube, which, by rotating, brings two sharp cutting edges to bear upon the pedicle of the growth, thus removing it.

Urethrography.—R. W. Stewart, of Pittsburgh, ¹⁶¹_{July; Sept. 21} describes a very ingenious instrument, which is capable of giving an exact drawing of all the irregularities of the urethra. Stewart showed me the instrument and demonstrated its function. It seems an ideal mechanical device, but its creation is to be deplored, since it will tend to increase the already too great cutting of that patient canal—the urethra. Already the young genito-urinary surgeon (and every village has one or more), in connection with every possible genital or urinary disorder, cackles with self-complacent surprise when he finds that one portion of the urethra is narrower than another (forgetting that the canal has these irregularities

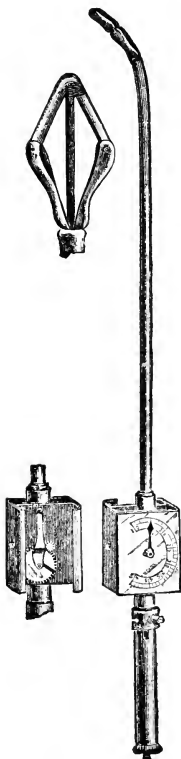
naturally), and at once proceeds to cut them, proposing to commence by bringing the urethra up to a uniform size, and then seek further, if his patient does not get well or become disgusted with the treatment. This instrument will, I fear, lead to still more routine unintelligent surgery in the hands of careless practitioners.

Stricture.—L. B. Bangs, of New York, ⁵⁹_{Jan. 26} reports a case of spasmodic urethral stricture, producing retention and calling for use of the catheter, caused by anal fissure, and cured by successful treatment of the latter (anal divulsion).

J. P. Bryson, of St. Louis, ²⁴⁵_{Aug.} concludes, after a careful study of the various causes contributing to originate organic urethral stricture, that the essential feature is a modification of the mucous membrane in such a way as to permit the leakage of urine or some of its constituents, and that the surgical indications are (1) to restore the mucous membrane to a normal condition, or, (2) failing this, to do away with urinary contact by producing an artificial channel for its escape.

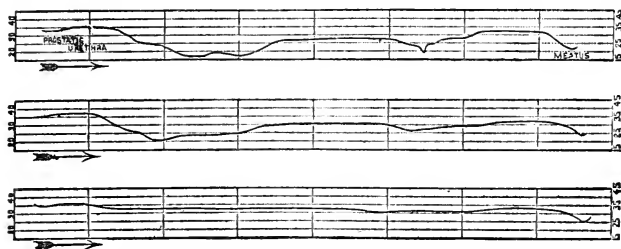
Treatment of Stricture.—Robert Newman, before the Medico-Chirurgical College of Philadelphia, ⁶⁰_{Apr. 13} repeated his assertions that electrolysis— $2\frac{1}{2}$ to 5 milliampères—radically cure urethral stricture, and stated that he had practiced the method for nearly twenty years with success. He considerably made mention of the case I published at Washington. In two papers, “A Defense of Electrolysis, etc.,” ⁶⁰_{Jan. 5} and “Success and Failure of Electrolysis,” ⁶²_{Dec. 15, '88} the same author criticises those who have failed to

adopt his statements as demonstrated, and fortifies his position by letters from a number of physicians who applaud him, notably one gentleman, who, in a distant State (Texas), has treated 300 cases “successfully” during the past three years. Another had been “successful in all cases” so far. It is, to say the least, curious



STEWART'S URETHRO-
GRAPH.
(*New York Medical
Journal.*)

that this simple method should succeed so uniformly in the provinces, while many serious efforts in the hands of competent men of large opportunity in cities have generally failed to demonstrate that it had any value whatsoever. It is curious, also, that Newman should have failed to avail himself of the challenge to prove his method by Brewer and Otis ⁵⁹ Feb. 22 by attempting to impose conditions the object of which is quite apparent to any disinterested intelligence. Other gentlemen have joined in this controversy, mainly in condemning and endeavoring to explain away my article in which, for what I believed to be the good of the profession, I disputed the claims of electrolysis. It appears that my article has given a new impetus to electrolysis, and Newman claims a harvest as a result of the free advertisement afforded him. This is not



TRACINGS SHOWING IRREGULARITIES OF THE URETHRA OBTAINED WITH STEWART'S URETHROGRAPH.
(*New York Medical Journal.*)

a matter of concern to me—"Magna est veritas et prevalebit"—and he who makes an effort in the right direction receives his reward, not in patients and in pecuniary gain, but in the consciousness of having worked gratuitously in a humanitarian spirit for the greatest good of the greatest number. This consciousness I honestly have.

In the meantime, J. A. Fort, of Paris, collaborator, is emphasizing through various journals a claim to radically cure stricture by the use of linear electrolysis, using an instrument like Maisonneuve's urethrotome, in which the blade divides the morbid tissue by burning its way through instead of cutting. This gentleman, in speaking of Newman's method, expresses in so many words his disbelief in its value, "*Ce procédé avait déjà été mis en pratique par Consell et Westheimer. Il est absolument inefficace.*" ¹⁰⁰ Dec. 13 His

cutting is done by the use of from 20 to 40 milliampères. Fort claims to have operated in 400 cases in South America. He operated on a patient for Berkeley Hill²_{Feb. 23} in the University College Hospital. Hill's conclusion is: "Fort's demonstration of his method proves that the process was clumsy, causing pain and wound of the urethra, and, lastly, that it is dangerous. It failed to greatly widen the stricture, yet excited considerable reaction on both occasions on which it was used." Lavaux,³_{Feb. 6} who has a large genito-urinary clinic in Paris, reports 35 cases operated on between 1880 and 1882 by Jardin, who used the Fort method, with a radical and permanent cure in no single case.

If the testimony of all the letters in support of electrolysis is no more accurate than that furnished by the letter of F. F. Sanders, of Rockaway, New Jersey, it is poor, indeed. This letter appears in Newman's "Defense of Electrolysis."⁶⁰_{Jan. 5} This gentleman informs Newman that, having received a pamphlet from him (Newman) setting forth the value of electrolysis, he determined to try it. He had not long to wait, for soon a patient called who had on the same day "been for the ninth time to Keyes's office for treatment of stricture. He said the doctor had failed to pass a sound through it and had never engaged the smallest whalebone bougie into it, and had that day given up his case in disgust." If he said that, he certainly drew upon his imagination for the facts. I never have given up a case in disgust—the thing is impossible. If I fail to pass a stricture, I keep at it until I do pass, or I cut without guide. If any one gives up in disgust it is the patient. As I had no recollection of any such case, I wrote as politely as I could to the doctor, inclosing stamped envelope for reply, asking him for the patient's name and the date of my treatment. This letter was never answered, but on January 29th the letter came back to me from the Dead-letter Office, marked as sent, October 29th; advertised December 6th; "unclaimed." The inference is obvious.

Baz,²⁶⁶_{Mar.} by aid of the instrument-maker, Vergne, has found a metallic substance which, as a thread of "complex composition," coated with silk and gum, served him to penetrate strictures in six cases where the other instruments failed. This instrument may be of service, but it is impossible that it can replace whalebone in this country.

Urethrotomy.—Gerster, of New York, ¹_{June 22} has devised a self-

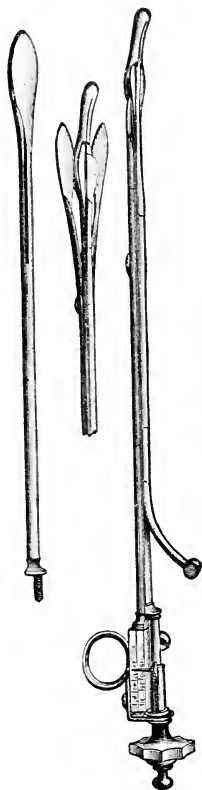
registering, dilating urethrotome, for which he claims the advantages of Otis's urethrotome and urethrometer combined, and the extra advantage that it may be taken apart in fifteen seconds and re-adjusted in half a minute after cleaning.

He prefers to cut dense, tight strictures by a number of small cuts in the same line rather than to effect the section in one movement. The instrument measures 15 (F.) closed, 45 (F.) open.

Kirmisson ³_{p.116} reports one case of successful primary suture of the urethra, both the urethra and the perineal tissues being sutured; and two cases of secondary suture, one of which only was successful. Drainage was by a catheter tied in the urethra.

Wolfer, of Graz, ²²⁶_{v. 37, 709} recalls the fact already published, that he reproduced mucous membrane upon a urethra from which he had excised an innodular stricture, and refers to two other cases. He mentions that he finds that the mucous membrane obtained from the stomach of the frog, the œsophagus of the pigeon, and the bladder of the rabbit are all easily separable from the muscular layer of the animal, and that they all adhere in the human subject, when properly placed, and retain their vitality. Following this line, some important advance may be presently expected.

Deep Urethral Stricture.—I have approached this question ⁵⁹_{May 25} by giving some personal cases in which permanent cure seemed to have followed the thorough division of stricture by perineal section, while acknowledging the failure of accomplishment of radical cure in a vast majority of the cases operated on. In seeking for an explanation of the difference I found that there are different forms of organic stricture,—the soft, the innodular, and the purely cicatricial fibrous stricture, with no innodular masses. My conclusion is



GERSTER'S URETHROTOME.
(*New York Medical Journal.*)

that the soft stricture, in which there is no fibrous organic change below the surface of the mucous membrane, but probably considerable spasmodic element, may be radically cured by dilatation or section; pure fibrous stricture only by thorough section, and subsequent use of large instruments for a considerable time, after which I believe instruments may be given up; innodular stricture, not at all radically, except perhaps after treatment by excision. I prove by two cases a possible increase in calibre of the cut strictured area after section during development of the genitals (pubescence) beyond the size of the dilating sound used to maintain the cure.

Perineal Fistula.—Guyon ¹⁶⁸_{May 1} believes that simple unindurated perineal fistula may be cured by dilatation of the urethra, but where much induration exists about a fistula he insists that the latter should be dissected out together with the pouch, which is usually found near the urethral surface.

Recto-Urethral Fistula.—Ziemlicki, of Lemberg, Austria, ³_{Oct.}, cured an inveterate urethro-rectal fistula, which had resisted a number of varied operations, by detaching and mobilizing all the extra-peritoneal part of the rectum, exactly as in the operation for extirpation. Then he sutured each orifice of the fistula separately, and by rotating the rectum partially he absolutely destroyed all chance of re-establishment of a fistulous tract. Cure was perfect.

DISEASES OF THE BLADDER.

Anæsthesia of the Bladder.—Alejandro Settler, of Madrid, ⁷⁶⁷_{Dec. 18}, adds a case to those already recorded in illustration of the danger attending the employment of cocaine in the bladder. His patient had been in the habit of injecting into the bladder daily from 30 to 40 grammes (1 to 1½ fluidounces) of a 4-per-cent. solution. Settler, wishing to employ the nitrate of silver, attempted to render the bladder insensitive by a preliminary injection of the same 4-per-cent. solution. He allowed it to remain in for twenty minutes, and then, after using the nitrate of silver, he put in another cocaine solution, and allowed it to remain about twenty minutes. The patient began presently to talk with great excitement and volubility. His utterance became indistinct, he became giddy, his gait was unsteady, his tongue and mouth dry. A cold, general perspiration followed, small, thready, rapid pulse, and repeated vomiting.

Zambianchi, of Vigevano, ²_{Feb.16} had a more serious experience. He injected 225 milligrammes ($3\frac{1}{2}$ grains) of cocaine subcutaneously into the breast. Epileptiform convulsions came on, with arrest of respiration, and, in spite of artificial respiration, death occurred in about five minutes.

A. Montalti, of Florence, ⁵⁰⁵_{Sept.; Feb.16} gave $1\frac{1}{2}$ grammes (23 grains) of cocaine, through mistake, by the mouth. Efforts at vomiting followed, pale face, cyanosis, dilated pupils, fall of temperature, unconsciousness, death. At the autopsy the brain and cord, with their membranes, were found congested, the brain surface covered with a thin layer of blood, and the subarachnoid spaces full of serum. The heart was contracted firmly; spleen, liver, stomach, and intestines congested; kidneys normal. A fatal case in which 20 grains (1.3 grammes) were given internally at the University College Hospital, London, is also reported. ⁸⁰_{Feb.} There were convulsions, followed by coma. The brain was found intensely congested with subarachnoid serous effusion. Simes introduced 3 grains (0.2 gramme) of cocaine into the urethra for the purpose of performing internal urethrotomy, the patient being 29 years old. There followed immediate contraction of the muscles of the face, dilatation of pupils, arrest of respiration, epileptiform convulsions, cyanosis, and death in twenty minutes. C. H. Chetwood ⁵⁹_{Aug.10} has written a general summary of the untoward effects of cocaine, taken from the cases reported up to the date of his paper, in testimony of the dangers which accompany the use of this drug.

Cystoscopy.—E. Hurry Fenwick, of London, in a number of articles ²_{Jan.5, May 4,11} during the year, and notably in a book ¹⁰⁰⁹ upon the subject, profusely illustrated, maintains the claims of cystoscopy, and shows some wonderfully clear visions he has had of the interior of the bladder. He is its stoutest upholder in England, and credits it with a very high degree of value. He reports at length on the subject, and tabulates 43 cases of cystoscopy, with results. Other interesting articles on the subject are reported by Cruise, of Dublin, ⁶_{Feb.23, Mar.21} especially on vesical irrigation in cystoscopy. Southam, of Manchester, ⁶_{April 13} and Berkeley Hill, of London, ⁶_{Jan.26} have contributed articles on cystoscopy. A. Broca ²⁶⁶_{Mar.} does the same; also Grünfeld, ⁸⁴_{May 26} ⁵⁷_{June 2} and Otis K. Newell. ⁹⁹_{Apr.18} G. von Antal, collaborator, sends a communication about a personal case, in which he successfully removed, through the urethra, a small papilloma

from the bladder of a man of 32. He located the tumor first with the cystoscope, and used a urethral forceps to catch and twist away the small tumor. All this under cocaine.

Foreign Bodies.—Guyon ²⁶⁶_{Sept.} has devised an olive hook for the extraction of small bougies, catheters, strings, and soft linear objects from the bladder which at once commends itself. On a soft stem is a metallic hook, like an ordinary olive bulb made into a hook. The figure explains it. The weight of the instrument makes it rake the bottom of the bladder and catch the loose, soft object, which may then be extracted, with no chance of catching the mucous membrane in the hook.

Semeleder, of Mexico, corresponding editor, communicates a curious case of foreign body, reported by Lavista. The blade of a knife was broken off in the bladder of a drunken man, and after remaining there two and a half years and becoming incrustated with phosphates was removed by the high operation. The man recovered.



GUYON'S CROCHET.

(*Annales des Maladies des Organes Génito-Urinaires.*)

Incontinence of Urine.—The strong tincture of *Rhus aromati-
cus* has been considerably vaunted in this country and in Belgium as curative of the nocturnal incontinence of urine in adolescents. Descroizilles ³⁵_{Apr.11} contributes 6 cases in which the remedy was persistently used up to 40-drop doses without effect, except in 1 case, a girl of 6. Max, of Brussels, praises the drug. Burweasch, Guion, and others in Belgium decide against it.

Stone.—Edmund Andrews, of Chicago, ¹²_{Sept.} gives statistics of 100 personal cases of stone:—

	Cases.	Deaths.	Percentage of Mortality.
Litholapaxy	40	1	2½
Lithotriety	6	1	17
Lithotomy (before puberty)	26	2	8
" (after ")	29	5	17

making thus the usual admirable showing in favor of litholapaxy.

P. J. Freyer, of the Bengal Medical Service, ²_{Oct.12} gives his most recent stone statistics from August 8, 1887, to April, 1889, 100

litholapaxies and 32 lithotomies, tabulating the same. There are a number of children among the litholapaxies. The largest stone from a child was a hard one, weighing 765 grains (50 grammes). It was successfully removed from a child of 9 years with a No. 8 lithotrite in two hours and five minutes. Another interesting case was a child of 18 months, the youngest child on record, three grains (0.2 gramme) being removed in eight minutes.

The statistics are admirable: One death in 100 litholapaxies (a man of 60); 2 deaths out of the 32 lithotomies.

D. Hayes Agnew, of Philadelphia,¹¹²_{Oct} and A. T. Cabot, of Boston,⁶¹_{Nov. 9} in articles dealing with the question of the choice of operation for urinary calculus, and A. Pulido, of Madrid, corresponding editor, in a personal written communication, give voice to what may be considered the best American and Spanish expression of opinion on the subject, in claiming litholapaxy as the operation of choice in all ordinary cases of stone in the adult at any age. Very large stones and selected cases, they agree, are better dealt with by the high operation, and when cutting is done in the perinæum they advocate the lateral operation for the child, the median for the adult. Cabot makes a plea for litholapaxy in children, an operation which is rapidly gaining favor.

Litholapaxy.—G. Dennys, of Jalandhar,²⁰⁶_{Nov. '05} adds his testimony in favor of the applicability of this operation to boys. He prefers Otis's washing-bottle to others. His table contains 13 cases, all cures. The average age of the boys was $7\frac{1}{2}$ years; the average size of the stone 183 grains (12 grammes). All were uric acid or oxalate of lime. The average stay in hospital was five and one-half days. The average number of minutes consumed in the operation was thirty-five and a half. Two stones weighed an ounce (28.5 grammes) each; one 420 grains (27.3 grammes); one 369 grains (24 grammes); one 320 grains (20.7 grammes). Comment is unnecessary.

Extirpation of the Bladder.—Brohl,¹¹³_{Jan. 7} reports the case of a man aged 57, operated on by Bardenheuer, from whom a thickened and ulcerated bladder was removed with the prostate by a large crescentic transverse incision. On the fourteenth day the patient died uræmic. One ureter was found occluded and its kidney hydronephrotic.

Excision of the Mucous Membrane.—The same writer reports

at the same time 3 cases of excision of the mucous membrane of the bladder. The first was a child of 7, with tubercular bladder. Through a section of the symphysis the bladder was exposed and its entire mucous membrane removed by the aid of forceps and scissors. The wound healed to a small fistula. Improvement in the general condition followed, but death terminated the case ten months later by tubercular peritonitis.

The third case was a male of 64, who had cancer of the bladder. The entire mucous membrane was removed with a portion of the posterior wall of the bladder. Thirteen months later the patient was about with a fistula above the pubis, unable to retain his urine.

The last case was a male of 30. The bladder was found covered within with small tumors. The entire mucous membrane was removed with scissors. Recovery followed, the patient, at best, being able to retain his urine two and one-half hours.

Intra-peritoneal Rupture.—W. Q. Skilling, of Lonacoming, Md., reports ¹⁰⁴_{Feb. 16} a remarkable case, remarkable if true, since doubt usually hangs about cases of this description. A patient aged 45, full of beer, was thrown down and held down by a knee pressed upon the abdomen. He immediately had hypogastric pain, thighs drawn up, etc., and, being intoxicated, morphine was administered subcutaneously. The following morning he had dribbling from the urethra, but a catheter introduced removed only a small quantity of bloody urine. He vomited freely. The abdomen became sensitive and distended; catheter, twelve hours later, withdrew 2 ounces of bloody urine. More morphine twelve hours later, abdomen enormously distended, breath offensive, respiration difficult, pulse hard to count. Now a catheter was passed, which Skilling thinks went through the rent and into the abdominal cavity, drawing off about half a gallon (1.9 litres) of bloody urine, after which the patient rapidly recovered under a continued use of the catheter. My personal impression is, in this case, that the bruising effect upon the neck of the bladder caused retention and escape of blood into the bladder. Dribbling of urine is never seen, so far as I know, in intra-peritoneal rupture of the bladder. The passage of the catheter and getting only 2 ounces mean that at that time a clot obstructed the eye. If there was a rent, the abdominal cavity would have held much more than 2 quarts. The symptoms, I

believe, were due to suppression, owing to an overdistended bladder. There is no other explanation which covers the rapid recovery of a man of 45, with the symptoms detailed.

In the 1889 series of the ANNUAL, a case of intra-peritoneal rupture, laparotomy, and suture, by H. H. Grant, of Louisville, is reported ⁶_{July 28, '88} as having resulted fatally. A private letter from this operator informs us that the patient, on the contrary, fully recovered.

Microbian Infection of the Urinary Mucous Membranes.—Guyon, ²⁶⁶_{May} in his usually masterly manner, has given his views upon this subject.

He introduced into the healthy bladder of animals pure cultures of pathogenic bacteria, such as are found in man and animals, and twenty-four hours afterward he was unable to find any microbes in the urine, and upon killing the animals the mucous surface of the bladder showed no lesions. To obtain the least degree of cystitis it was necessary to inject massive doses of the most virulent organisms, and even then the effect did not extend beyond the bladder. The penis was ligated in animals and rupture of the bladder allowed to take place. Dissection then showed vascularity highly increased with ecchymosis, dilatation of ureters, and congestion of the kidneys, but no micro-organisms. When pyogenic bacteria had been injected into the bladder, before the application of the ligature, the mucous membrane of the bladder was found to be œdematous in from four to six hours, and the grade of cystitis and its extent were found to correspond to the duration of the ligation of the penis. The conclusion is that the receptivity of the mucous membrane for pathogenic bacteria is proportionate to and dependent upon the lesions produced by previous retention. He believes that the urethra does not naturally give passage to germs, that these are introduced by instruments, and that they take root when the receptive condition of the individual is suitable—not before. Guyon divided the medulla in two rabbits, and injected the bladder of one with pyogenic bacteria. Dissection after forty-eight hours showed both bladders enormously distended. The one injected was the seat of œdematous cystitis; the urinary apparatus of the other was aseptic.

Operative Treatment of Tubercular Cystitis.—J. L. Reverdin again brings up this subject. ²⁶⁶_{May, June} The case upon which the

present communication hangs was operated on more than two years before the date of the article, and was a case of secondary (not primary) tubercular disease of the bladder. The treatment was by supra-pubic section, raclage, and cauterization. The history is a long one. Both testicles and cords were affected in a tubercular way, the prostate was involved, a very large perinephritic abscess coming on later. There was great trouble in closing the supra-pubic fistula, yet the patient at the end of two years retains his urine from one and a half to two hours, voids it without pain, the flow being clear and free from blood. Surely the history is an encouraging one. Reverdin cites all the other cases to which he has had access, and one, unpublished, communicated by Roux, of Lausanne, making a total of 11 observations—Iversen 1, Schatz 1, Clinic of Trendelenburg 3, Guyon—who first designedly opened the bladder by the supra-pubic way in an attempted cure of local tuberculosis—3; this he did in July, 1885, a few months after Iversen's case. Iversen did not diagnose tubercular disease, and performed cystotomy for the purpose of dealing with an ulcer in the bladder of a young girl—Poncet 1, Roux 1.

Guyon ²⁶⁶_{Nov.} reports the ultimate result of 4 cases. Case 1 remains absolutely well locally, with perfectly clear urine, although his operation (high section) had been done five years previously. The patient's general condition was precarious, and he continued a little opium from habit. In the case of the second patient, the hypogastric opening never closed. His general condition was that of urinary cachexia. He died two years and three months after operation, and at the autopsy both kidneys were profoundly altered, disorganized by suppurative pyelonephritis. The seminal vesicles were tubercular, and the bladder thickened, but not tubercular. The third patient died one year after operation, still having fistula. Both kidneys were involved,—a condition diagnosticated (on one side at least) before operating. The bladder showed sound mucous membrane, but cheesy foci in the submucous tissue containing tubercle bacilli. Fourth case was operated upon by Hartman by perineal drainage. Death occurred in three months. Drainage had been complete, but the tubercular ulcers and granulations persisted on the mucous membrane, which had not been the case after supra-pubic operation and curetting, with the use of the hot iron and iodoform. Hence Guyon concludes that early operation and

removal of local foci of disease is justifiable, and may give hope of radical cure.

Supra-pubic Cystotomy.—K. Eigenbrodt, of Bonn, ³⁰¹ ⁹⁶ gives a *résumé* of the methods now employed by Trendelenburg in his clinic. He does not place as much stress as formerly upon rectal inflation, and distends the bladder only moderately, since reported cases of rupture are on the increase. Occasionally he operates without distending the bladder at all. He does not think preparatory treatment in attempts to distend contracted bladder of any value, and believes that the preparatory treatment of cystitis is uncalled for. He thinks that asepsis is best secured by open treatment of the bladder wound.

He has come to prefer the transverse to the median incision in some cases, as it gives a very free view of the interior of the bladder. The incision aims at dividing the tendons as close to the bone as possible, the fat is separated by blunt means, and the peritoneal fold easily rolled up. Drainage is effected by T-tubes in either angle of the wound, and the lateral position with flexed lower extremities. A frequent change of position is urged for children and the aged. He never completely closes the vesical wound. He removes bladder drainage at the end of first or second week—38 cases, of which 7 died, making a mortality of 18.4 per cent.

Isolated cases of supra-pubic cystotomy have appeared from various hands in all quarters. The operation continues to grow in favor. Among groups of cases may be mentioned: Bangs, ¹ ^{June 22} 6 cases, all successful; Sir Henry Thompson, 31 cases, reported by H. T. Herring; ² ^{July 6} 2 cases by the old method, both fatal; 11 cases for tumor, 1 fatal, and that from pyæmia; 18 for calculus, 3 deaths, leaving out 1 case in which the operation is excused from blame. These results are excellent, since Thompson's well-known ability with the lithotrite and his advocacy of the perineal method make it certain that only the most formidable examples of disease were subjected to the operation about which the statistics are concerned; J. A. Wyeth, of New York, ⁵⁹ ^{Aug. 17} reports 8 consecutive successful cases.

Solomka, of Tiflis, ³³⁶ ^{June 22} supplies statistics from various Russian operators upon the high operation for stone, dividing the operations into two groups. The first is before the antiseptic period:

cases, 62; deaths, 23; unknown, 1. He eliminates 4 cases (erysipelas, marasmus, pneumonia, and enteritis); thus allows only 19 deaths in 62 cases, which equals 30.6 per cent., and quotes the percentage mortality claimed by other operators and collators. Günther, 26.6 per cent.; Dulles, 28.2 per cent.; Flury, 32.6 per cent.; Garcin, 24.4 per cent.; Fuffier, 27 per cent.; Rodsenitsch, 25 per cent. This is not at all a good showing for stone operations. The 62 patients average in age as follows:—

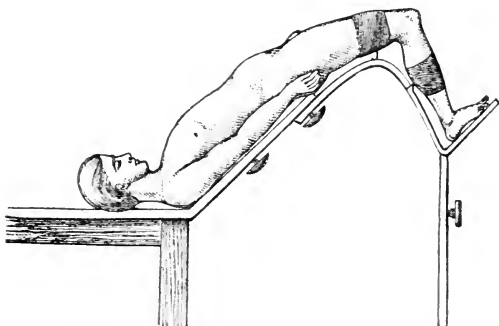
30 from 1 to 5 years.	2 from 32 years.
8 " 5 to 10 "	1 " 40 "
9 " 10 to 15 "	1 " 70 "
2 " 15 to 20 "	90 " unknown.

In fact, the showing is disgraceful, particularly when it is noted that 8 cases were female, and that the stones weighed between 1 (15 grains) and 328 (10½ ounces) grammes. The results after the adoption of antiseptics are much better—424 cases with 59 deaths, percentage of mortality 13.9. Yet still the result is not good when estimated by the standard of what ought to be expected in stone operations. These cases contain 1 woman and 11 girls. As to ages:—

AGES.	Cases.	Deaths.
1 to 5 years.	120	17
5 to 10 "	117	10
10 to 15 "	23	3
20 to 25 "	30	5
25 to 30 "	18	1
30 to 35 "	6	2
35 to 40 "	5	1
40 to 45 "	4	3
45 to 60 "	12	3
60 and over	11	3
Unknown	35	5

This is simply terrible, namely, out of 260 cases under 15 years to have 30 deaths,—a mortality of 11.5 per cent. No surgeon would dream of having that mortality with the lateral operation, and the showing becomes still more unsatisfactory when it is observed that the stones weighed from .2 (3 grains) to 545 (20¼ ounces) grammes. The only conclusion possible seems to be that the high operation is being overdone, and that it is time to decide finally in favor of litholapaxy and perineal openings, especially for small stones and young people.

R. Fowler, of Brooklyn, ⁵⁹_{Sept. 7}, suggests a new method of drainage in supra-pubic operations. He selects hygroscopic cheese or butter-cloth, and, first sterilizing by heat, he dips it into a hot, milky mixture of oxide of zinc and distilled water, to which a little glycerin has been added. (He also uses other materials.) The folded squares of cloth are placed in the hot mixture, which is kept agitated to prevent precipitation. They are then wrung out and packed in air-tight sterilized jars. Strips of this material are packed into the bottom of the cavity of the bladder, and allowed to project two or three inches (5 to 7.5 centimetres), the projecting end being placed upon rubber cloth, and maintaining drainage by capillary action.



RETENTION OF URINE IN PROSTATIC ENLARGEMENT.
(*British Medical Journal*.)

Sonnenburg ⁶⁹_{Feb. 23} partly resected the pubic symphysis to cure a deep-lying fistula following supra-pubic cystotomy. He succeeded in curing the fistula after repeated cauterizations. Langenbuch ⁶⁹_{Feb. 23} tried to do external perineal urethrotomy without guide for stricture, but failed to enter the bladder, therefore he did a supra-pubic cystotomy, took away a crescentic strip of bone beneath the symphysis, and so entered the bladder, whence he performed retrograde catheterization, and thus terminated his perineal section—surely a long way round. He reported his patient as entirely well.

Trendelenburg, of Bonn, ²_{Oct. 19}, at a meeting of the British Medical Association, at Leeds, explained his views regarding supra-pubic cystotomy and laparotomy. He advocates transverse section

of the recti muscles and cares little or nothing for rectal or vesical inflammation. The figure represents what is called his position, and an apparatus attached to the table for its application.

F. S. Watson ⁹⁹_{Apr. 18} has collected for study 100 reported cases of primary vesical suture after supra-pubic cystotomy. He finds that 35 per cent. healed by first intention, and that whatever harm is recorded as having arisen from the suture was invariably due to not having left the abdominal wound open. His conclusions are: 1. Suture should be employed when the pathological changes in the bladder are slight. 2. Suture should be avoided when the bladder-walls are much thickened, when there is much liability to hæmorrhage within the bladder, or when there is foul cystitis, and the abdominal wound should be left open for the greater portion of its extent. 3. Short needle and catgut should be used, with that form of suture which is most easily introduced.

Vesical Prostatism.—Guyon ²⁶⁶_{Feb.} groups under this title a set of clinical phenomena produced by a direct alteration of the vesical muscle. This alteration is often consecutive to prostatic hypertrophy, but it also exists in a certain number who have no mechanical obstacle to micturition. In either case it is the consequence of lesions which prepare the senile modifications of the urinary apparatus. The detrusor muscle is thinned. Albarran, one of Guyon's former internes, has made a histological study of the condition, showing that the muscular coat of the bladder is not only thinned, but also that the muscular bundles, separated by bands of sclerosed tissue, are diminished in volume. The connective tissue penetrates into the interior of the muscular bundles, separating the groups of fibres and the isolated fibres in a state of simple atrophy, without fatty degeneration. This connective tissue of new formation is invaded by fat, especially in the most external part of the muscular layer, and there may be found bundles of atrophied muscular fibres entirely surrounded by fatty tissue. A fatty layer beneath the peritoneum is in direct continuity with the fat which infiltrates the muscular wall of the bladder. The mucous membrane of the bladder has undergone inflammatory transformation into embryonal tissue rich in capillaries. This primitive muscular impotence of the bladder, as Guyon calls it, comes on in the age of prostatism, 50 to 70. It is attended by simultaneous dilatation of the ureter and pelvis of the kidney, even when there

is no prostatic obstacle. The bladder dilates, there is polyuria, and often concomitant hæmaturia. Anuria is rare, polyuria is the rule with these patients, an index of renal changes, and the patient dies secreting an enormous quantity of urine. With the vesical distention co-exists surface congestion of the mucous membrane—a venous stasis yielding spontaneous hæmaturia, or a hæmaturia easily provoked by an untimely and too sudden emptying of the bladder. Pyelitis and pyelonephritis are the legitimate consequences of this dilatation. Arterio-sclerosis is the bottom factor in all these changes. It is a condition more or less common in all prostatics, as has been shown by Lannois, and in the evolution of symptoms there is always, Guyon believes, simultaneous lesion of the kidneys, the bladder, and the prostate, and according to their chief situation the symptoms which preponderate are prostatic, vesical, or renal. Prostatic lesions are most common and are least dangerous.

DISEASES OF THE PROSTATE.

Enlarged Prostate.—F. S. Watson, of Boston, ⁹⁶_{Jan.} in an admirable and elegantly-illustrated monograph, concludes that in cases where it seems desirable to operate the perineal road is the safer. He thinks that digital exploration should first be made through the perinæum. In two-thirds of the cases he believes that all necessary operating can be effected through this opening. If the perineal distance is too great, or the form of the median enlargement demands it, the operation may be completed by an opening above the pubic bone at once or later.

A. W. Mayo Robson, of Leeds, ²_{Mar 9} reports 2 cases of successful prostatectomy by the McGill method. Both patients also had stone, one of them 50 small ones.

Buckston Browne, of London, ⁶_{May 18} records a successful case in which he removed nearly 4 ounces (113.5 grammes) of prostatic overgrowth, through a supra-pubic incision, from a man of 87, and afterward fitted him with a supra-pubic plate and tube, which afforded great relief.

Hermann Kümmell ⁶⁹_{Apr. 8} reports 3 successful cases of extirpation of the third lobe by the supra-pubic operation, the offending portion of the prostate being removed with the Paquelin thermocautery. He sutures the bladder, and drains through the urethra with a Nélaton catheter.

W. A. Lane, of Guy's Hospital, ⁶_{Apr. 27} records a supra-pubic prostatectomy, in which death occurred on the eleventh day from bronchitis.

McGill, of Leeds, ²_{Oct. 15} in a paper read before the British Medical Association, gives his results with his method of prostatectomy, and a table of the cases operated on at the Leeds General Infirmary to July, 24 in number. Out of these, in estimating the final result, he deducts 7 cases where there was also stone; 4 deaths—3 from the operation, 1 from pneumonia—2 cases still under treatment, and 1 that cannot be traced. This leaves 10 cases; 8 had remained well and done without the catheter, only 1 requiring a catheter after hard drinking; 2 cases were relieved only, 1 requiring permanent supra-pubic drainage, the other being only improved for a time, and dying ten months after the operation. He believed in enucleating as much as possible with the finger, cutting as little as possible. Bruce Clarke at the same meeting reported 2 cases operated on successfully, at least so the report seems to read. Jordan Lloyd had operated three times successfully. Bennett May had operated four times with 1 death.

Rushton Parker, of Liverpool, collaborator, reported at the Leeds meeting 2 successful cases of prostatectomy by McGill's method and 1 of supra-pubic drainage, which gave great relief in a case of ulcer of the base of the bladder, in which perineal drainage had failed.

Exposure of Prostate and Bladder by Perineal Incision.—Gukerkandt, ¹¹³_{Nov. 21, 22} by a 2½-inch transverse perineal incision, turning back the rectum, proposes to expose the prostate, seminal vesicles, and base of the bladder for operative purposes.

DISEASES OF THE URETERS.

Stone.—F. Eklund, of Stockholm, Sweden, corresponding editor, communicates a case reported by Berg, of Stockholm, in which a calculus as large as a nut, retained in the dilated end of the right ureter, was successfully removed, after several efforts, by dilating the urethra, and after failure of forceps, which slipped off, using a curette.

Catheterization of the Ureter.—P. Poirier, ³_{Sept. 4} claims to succeed always, upon men as well as upon women, in catheterizing the ureter with a sound, which he has had especially made for the

purpose, by the aid of Nitze's cystoscope, or that of Boisseau du Rocher, which he prefers. He passes the exploring sound through a little canal included in the tube of the cystoscope. He thinks that by this means, also, the orifice of the ureter may be dilated to facilitate the escape of impacted calculus.

Cancer.—Chismore, of San Francisco, ⁷⁷May reports a case of hæmaturia, which, on autopsy, was found to come from cancer of the ureter.

DISEASES OF THE KIDNEYS.

Renal Calculi.—Ebstein, of Göttingen, ³Nov. 17 acting (with Nicolaïer) upon dogs and rabbits, succeeded in producing urinary calculi by administering oxamide with the food. The calculi were hard, formed of concentric layer, had a radiate structure, and were built up upon an organic base.

F. W. Kirkhaur ⁶Mar. 16 cured a case of calculus anuria, making his incision from the tip of the last rib downward toward the anterior superior iliac spine. A calculus, as large as a date-stone, was found in the ureter (left) about half an inch (1.25 centimetres) above where the ureter crosses the commencement of the external iliac artery.

Ralfe and Godlee, ²⁵Mar. 20 at the Clinical Society of London, detailed a case of double impaction of urinary calculus, in a lady of 26, relieved by operation. She had had double nephritic colic and complete suppression for fifty-three hours at the time of the operation. The left kidney was first exposed and opened. Stone was detected by passing the finger 2 inches (5 centimetres) down the ureter. This was extracted by a vertical incision and a tube was left in the pelvis of the kidney. A large quantity of urine thereafter escaped by the wound, but none by the urethra for three days. The right kidney was opened later, and a mass of gravel found in it, but no stone. A small calculus passed later. In this instance the right ureter was proved to be patulous by pouring into it above some ink-stained fluid, which instantly escaped by the urethra. The patient recovered perfectly.

Nephralgia.—L. McLane Tiffany, of Baltimore, ⁹⁶Aug. conceived the happy idea of relieving presumptive tension in a kidney, the seat of intense and recurring nephralgia of several years' duration, in which no stone had been passed. He therefore cut down upon the kidney, and, failing on exploration to find stone, even by

exploring the pelvis by Jordan Lloyd's method, he split the capsule 3 inches (7.5 centimetres) or more, and obtained a prompt cure, lasting up to the report of the case, four months, although Tiffany modestly disclaims positive cure, and continues to watch carefully for relapse. The new operation seems a rational and a promising one.

Nephrorrhaphy.—Frank,⁴_{Mar. 4 to 13} discussing the results reported from various sources, concludes that the operation is a good one. He tabulates 61 cases. Landau spoke against the advisability of the method as one for general adoption. Küster thought very well of it, and believed that it had a future. Tuffier⁷_{Nov. 4} gave the results of two new methods of nephrorrhaphy, founded on personal experiments upon animals. The first new method is to place the kidney outside the fascia transversalis, and to suture the latter in front of the kidney. In this new position the kidney remains firmly fixed and performs its function perfectly, as demonstrated upon animals in which the other kidney was removed. The animal survived without the least accident. The second method is to detach the capsule from the kidney at the points of fixation. The raw surface of the kidney adheres perfectly.

Tuffier,¹⁴_{Oct. 13} in reporting his 13 cases of nephrorrhaphy to the French Surgical Congress, October 7th, summarizes his operative methods as follows: Lumbar incision, fixation of the kidney by two heavy catgut ligatures passed through the renal substance, denudation of the inferior third of the kidney, colopaxy (fixation of the colon), antiseptis, horizontal position for three weeks.

Guermonprez, of Lille,¹⁰¹_{Apr.} advocates the use of silk-worm gut as the best substance with which to suture the kidney in place. It never absorbs, becomes encysted, and is better tolerated than silk, in his opinion.

Guyon²⁶⁶_{Apr.} employs sutures passed through the parenchyma of the organs, and suspends the kidney around the last rib. He does not consider it necessary to freshen the kidney. He reports 2 new cases. Tuffier has put his second proposition into successful practice.

Le Cuziat¹⁰¹⁰ records satisfactory results in 21 out of 22 cases. He steadies the kidney by one or two fixation catgut ligatures, and then decorticates the entire posterior part of the organ over an area of about 1 inch (2.5 centimetres) wide, then attaches

the free borders of the divided capsule on both sides, by two or three sutures, to the lips of the wound. He ties into the wound the lower catgut fixation suture, and attaches the upper one to the periosteum of the last rib (externally).

Nephrolithotomy.—Le Dentu¹⁴_{Oct. 13} reported to the French Surgical Congress, October 7th, 2 cases of immediate reunion of the kidney after extracting stone. One failed; one, sutured with seven heavy catgut sutures, not too tightly drawn, succeeded absolutely, not a drop of urine escaping, the patient being completely well on the eighteenth day.

Hydronephrosis.—F. Eklund, of Stockholm, corresponding editor, communicates an interesting case of recurring hydronephrosis under the care of Stabell, which got well after the passage of a small calculus.

Nephrectomy for a Horseshoe Kidney, one-half of which was Hydronephrotic.—Socin, of Basle, ⁷⁶¹_{B. 9, H. 1} performed laparotomy and drained the cyst, and then for the persistent urinary fistula undertook extirpation. During the operation he discovered that he had to do with a horseshoe kidney, but, as the connecting isthmus was only slightly adherent to the great vessels, he cut it off with the thermo-cautery, arrested hæmorrhage from the stump with five points of suture, covered in the stump with flaps of the capsule, which were sutured, and made abdomino-lumbar drainage. The result was excellent and recovery uninterrupted. Nephrectomy is not any longer a novelty, successful cases being reported on all sides. There is very little novelty, but much excellent work has been done. Julius Schmidt, of Cologne, ⁶⁹_{May 23} reports a case showing that partial nephrectomy is a possible operation.

W. W. Keen, of Philadelphia, ⁶¹_{June 1} calls attention to the fact that a calcareous vessel detected by puncture with a needle in a kidney may be mistaken for a calculus.

Knowsley Thornton²⁵_{May 29} reports 25 cases of nephrectomy performed by him through the abdominal incision. He had 20 recoveries and 5 deaths. Clement Lucas reported at the same meeting 6 cases of lumbar operation without a death.

Single cases of nephrotomy, nephrolithotomy, and nephrectomy have been reported by numerous operators.

Kendal Franks, of Dublin, collaborator, communicates that he removed by nephrolithotomy a renal calculus from a man of 22,

which had for its nucleus an ordinary sewing-needle which had been swallowed by the patient when a boy at school.

ORTHOPÆDIC SURGERY.

By LEWIS A. SAYRE, M.D.,

AND

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NEW YORK.

HIP-JOINT DISEASE.

WITHIN the past year more than ordinary attention has been paid to the subject of *morbus coxarius*, if we may judge by the numerous discussions in the various journals and medical societies, both in this country and in Europe. Nearly all the authorities agree that disease of the hip-joint begins in a simple inflammation (from some slight trauma) either in the soft parts or bony structure, subsequently becoming *tubercular* by *inoculation*, then purulent; in other words, nearly all joint affections of a chronic nature are *tubercular*. In the hip the tubercular hyperplasia begins, primarily, either in the young tissue at the junction of the neck and head of the femur, or in the same tissue at the lines of the union between the three portions of the acetabulum in the neck or in the head of the femur, or, finally, in the synovial membrane of the joint. Starting in any one of these situations, it may spread to any or all of the other parts of the articulation. Wherever it makes its appearance, *tubercle* in joints is subject to the same changes as in any other part of the body. In the first place, if the *vitality* of the individual or affected tissue be improved, the bacilli may be arrested in their growth, may ultimately die, and the infected area recover, with more or less alteration of structure. If this be the accepted pathology of the disease, its eradication evidently depends, in a very great measure, upon improvement in the general vitality of the whole system.

As to the best means to pursue to reach this object, there is a great diversity of opinion. Many advocate immediate and heroic measures, even in the very early stages of the disease, viz., the complete and perfect removal of all the parts and tissues infected

by the tubercular deposit by surgical operation, claiming that if this is done under *strictly antiseptic precautions* it is always safe and results in speedy recovery, and that with a more useful limb than when treated by mechanical means and allowed to go on to suppuration and exfoliation by caries or necrosis. They also claim a great diminution in the rate of mortality. This we think questionable, as the statistics are not sufficiently numerous, neither has sufficient time elapsed, to form any positive and definite conclusions. Some few are opposed to exsection under any circumstances, or to any operative interference in any stage of the disease, preferring to rely upon mechanical treatment for many years and the recuperative powers of nature.

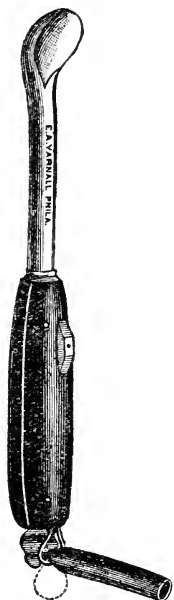
The true principle of treatment doubtless lies between these two extremes. In the immense majority of cases, if the disease is diagnosticated in its *early* stage, as it should be, and properly treated by *perfect rest* of the part, and protected from all *intra-articular pressure or motion* of the joint involved, for a sufficient length of time for all *irritation* to subside, while at the same time the general system is sustained by a nutritious diet and *free exercise in the open air* (with the diseased joint thus protected), it will recover without much or any deformity, and with more or less perfect motion of the joint. But in the exceptional cases, where, after the most perfect local and general treatment has been adopted, the disease still continues to progress, then *exsection* and *radical removal* of all the tubercular disease becomes an absolute necessity.

Harry M. Sherman^{Feb.} reports 8 cases of early exsection of the hip, 4 of which healed by primary union, 1 is rapidly healing, only a small sinus remaining, 2 are still suffering from prolonged suppuration, and 1 had died.

Arthur E. Barker, Surgeon to University College Hospital,^{Jan. 19} in an address before the Brighton Medical and Chirurgical Society on the "*Technique in Removing Tubercular Disease from the Hip-joint*," after declaring his belief in the tubercular character of hip-joint disease, recommends very strongly its early and complete excision. As his method of performing the operation is somewhat different from the usual proceeding, we quote him rather fully, as it is impossible to do him justice by any abstract of his proceeding. He says: "It has for a long time appeared to me that if all the tubercular disease in a hip-joint could be completely excised at

once, so that only sound structures should be left behind, it ought to follow, inasmuch as the tubercular process is not a suppurative one, that primary union of all the surfaces of the operation cavity could take place at once, without any necessity for that prolonged drainage which has hitherto been the rule. In the first place, the most rigid and uncompromising asepsis is insisted on. Everything turns upon this. Antiseptics are, of course, used for the operator's hands, the instruments, sponges, etc., but only sparingly for the patient's wound. The incision I have used for several years past is that originally proposed by Hueter, of Greifswald, in 1878, and a little later in this country independently by R. W. Parker. It commences on the front of the thigh, $\frac{1}{2}$ inch (0.013 metre) below the anterior superior spinous process of the ilium, and runs downward and a little inward for 3 inches (0.076 metre). As the knife sinks into the limb it passes between the tensor vaginæ femoris and glutei muscles on the outside, and the sartorius and rectus on the inside, until it reaches the neck of the femur. This incision does not divide any muscle-fibres, nor either vessels or nerves of the slightest importance. It is unnecessary to carry the deeper part of the incision to the full extent of the external wound. If an abscess is opened up before the joint is reached, its contents are thoroughly flushed out with sterilized hot water, at a temperature of between 105° and 110° F. (40.55° and 43.33° C.), before anything further is done. For this purpose I have had a large 3-gallon (12 litres) can made, which has three taps below, to each of which 6 or 8 feet (1.83 or 2.44 metres) of India-rubber tubing is attached. This can is placed some feet above the operating-table, so as to have a considerable pressure of water. Each of the rubber tubes terminates in one of these instruments, which I have designed for the double purpose of enabling the diseased cavity to be flushed out with the hot water, while softened bone or tuberculized synovial tissue can be gouged or scraped away simultaneously; this has been found to save much time and disturbance of the wound. The abscess having been cleared out by means of the rush of hot water, aided by these flushing gouges, the neck of the femur is sawed across with a narrow saw in the direction of the external wound. The diseased head can then be lifted out by means of the flushing scoop or a sequestrum forceps, through which the hot stream is rushing into the joint. By the

time the head of the bone has been got out the whole cavity is comparatively clean. Now begins the search for further disease. This can usually be easily estimated by the left forefinger, with which the acetabulum is first examined, and then all the other parts of the joint-cavity. Wherever diseased material is felt it is



FLUSHING GOUGE
WITH RUBBER TUBE AT-
TACHED TO HILT. THE
TUBE IS CLOSED BY A
SLIDING RING MOVED
BY THE BUTTON IN THE
HANDLE. THE CUTTING
EDGE OF THE GOUGE
RECEIVES THE FULL
FORCE OF THE WATER
RUSHING THROUGH THE
HANDLE.

(*British Med. Journal.*)

cut away by the flushing gouge or scoop, while the hot water carries away the *débris* as fast as it is produced, and with it all blood, while at the same time it arrests bleeding from the fresh-cut surfaces. When every part of the field of operation has been gouged and scraped clean of all tubercular material, and the water runs away clear, the cavity is dried out with carbolized sponges, one or two of which are left in until all the stitches are placed in position. These, which are of hard carbolized silk, should dip deeply and be placed close together. Just before they are tied the sponges are removed, and with them the last traces of moisture. The wound is then filled up with iodoform emulsion and the sutures are tied, as much of the emulsion being squeezed out at the last moment as will come away. A little iodoform is now dusted over the surface of the incision, in which there is no drainage-tube, in most cases, and the whole joint is covered with salicylic wool, so adjusted in strips that evenly-graduated pressure is brought to bear upon every aspect of the field of operation while the limb is held well abducted. If the wool be now firmly compressed with a spica bandage, the walls of the whole clean-scraped cavity are brought into contact, and the remainder of the

neck of the femur is thrust into the acetabulum and secured there.

“Now, where all this has been done, although there remains potentially a cavity, there is actually nothing of the kind, for all the surfaces have been brought into apposition. And then, assuming that perfect asepsis has been observed, all these surfaces ought to unite with a minimum of plastic exudation. After the opera-

tion the patient is at once placed upon his double Thomas splint as before. Let me now give you the result of the first operation done on these principles. On July 3d last I excised the hip of a boy, aged 5, which was extensively diseased, and converted into an abscess in spite of careful treatment on a double Thomas splint, etc., for a year, and who was rapidly becoming worse. The operation was done as above, and the wound stitched up completely without drainage. There was no shock at all, although the operation was long and severe. The first dressing was left undisturbed for ten days, at the end of which time the wound was found to be soundly healed. The stitches were removed on the thirteenth day, and the boy went home on the following day. He remained on the double Thomas splint for eight weeks, when it was removed by the parents on his going to Eastbourne, where he began to run about almost at once. Since then he has remained quite well, and is now running about with only a short linear scar in front, and with less than $\frac{1}{2}$ inch (0.013 metre) shortening of the limb. Not a trace of any mischief can be discovered about the joint, and the latter is slightly movable. Bilton Pollard had 4 cases of a similar kind at the Children's Hospital, in which he operated on very similar lines, cleaning out the joint very thoroughly (but without hot-water flushing) and stitching up the wound firmly without a drainage-tube, and using the iodoform emulsion as just described. In all 4 primary union was the result, and 3 have remained permanently closed ever since. In one the wound re-opened again a little, but is now nearly closed."

A. F. Jonas, of Omaha,^{106 Aug.} reports 4 cases of exsection of the hip-joint for *tubercular inflammation*,—under strict antiseptic precautions,—all of which healed by primary union and without any febrile excitement. He says: "I performed the operations after the plan proposed by Kocher, because it exposes and gives better access to the joint than any line of incision. The incision is made parallel with the fibres of the gluteus maximus toward the point of the trochanter major, from this point downward along the long axis of the femur; the first part of this incision being 8 centimetres (3.25 inches) long, the second part at least 6 to 8 centimetres (2.35 to 3.15 inches). The upper part of this incision passes through the gluteus maximus, lays bare the gluteus medius and minimus and the upper border of the pyriformis. As we follow the course of these

muscles we easily recognize their attachment to the trochanter major; cutting through the thick fascia, over the trochanter, to the bone, we sever the attachments of the above-named muscles; then, passing downward, the obturator internus and externus, gemelli superior and inferior, the quadratus and the vastus externus in front, are severed close to their attachments. We will notice that by this procedure we have avoided all the important nerve-branches that supply these muscles. The only artery that has been cut is the external circumflex. The parts are now retracted. The thigh is flexed on the abdomen and adducted; we will find the joint before us after dissecting away the connective and adipose tissue. It is not difficult now to incise the posterior portion of the capsule, if it is still intact; the ligamentum teres can be easily severed, if not yet destroyed; if the thigh is strongly adducted and flexed, and rotated inward, the cotyloid cavity can now be easily inspected, and such portions of it removed as are necessary with pincette and scissors or sharp spoon and chisel, or the head of the femur removed with a chain-saw. After a thorough removal of the fungosities, the wound is thoroughly irrigated with an antiseptic solution, drained, and sutured; an antiseptic dressing is applied, and the leg put on a Volkmann extension sliding apparatus.

"I believe that as soon as we are convinced that conservative measures, after a reasonable trial, have accomplished little or nothing, or, at best, prolong suffering for an indefinite number of years, the earlier that we extirpate the tuberculous masses, the better do we subserve the happiness and welfare of the sufferer. Since we have a local tuberculosis to deal with, I can see no reason why we should any more hesitate to remove it than a tubercular process of the knee or of any other bone or joint."

Lewis Hall Sayre,^{59 Jan. 15} exhibited at the New York Pathological Society, November 14, 1888, the head and neck of a femur, removed five weeks previously from a boy 7 years of age, who was suffering from hip-joint disease. Up to the age of 4 years the boy had enjoyed perfect health. At that time he had a severe attack of diphtheria, followed by serious inflammation of the eyes, which kept him confined to his room for some time. He also had severe middle-ear disease, involving the mastoid process. It was then that the first symptoms of hip disease manifested themselves. The course of the disease was marked throughout by comparatively

little pain, although there had been suppuration and abscess formation. When the speaker first saw the boy the thigh was flexed at nearly a right angle with the trunk, and there was a large fluctuating tumor in the neighborhood of the trochanter major. It was decided to operate, both for the purpose of correcting the deformity and of giving exit to the pus. When the capsule of the joint was opened it was found that the head and neck of the femur were carious, and these parts were accordingly excised. The acetabulum was not diseased. Five weeks after the operation the wound was completely closed, some motion at the hip was possible, and the boy bids well to make a fair recovery. This boy was presented to the society in October, 1889, in perfect health and with good motion. ⁷⁶⁰
_{Dec. 28}

Our corresponding editor, F. Semeleder, City of Mexico, ⁶⁷³
_{Oct.} informs us that R. Laoirta ⁷⁸⁴ refers to a case of linear osteotomy of the anatomical neck of the femur for secondary ischiatic luxation after purulent arthritis. He highly recommends a new proceeding, abandoning the classical ileo-trochanteric incision for one on the postero-interior and superior part of the thigh, where the skin, cellular tissue, and the femoral aponeurosis are divided, following the ascending ramus of the ischium; then, starting from the tuber ischii, he meets the insertion of the great adductor muscle, separates it with a lever, reaching immediately the foramen ovale. By this method we only meet the obturator artery and nerve, and give easy outlet to the products of inflammation.

Wallace Blanchard, ²³¹
_{June} in speaking of the mechanical treatment of hip-joint disease, says:—

“It is beyond question that a really efficient apparatus for hip disease must meet three requirements: 1. It must afford traction *outward* as well as downward, so that the mean force exerted shall be in an axis with the neck of the femur, and thus relieve from pressure all the articulating surfaces of the joint. (See Fig. 1.) 2. It must afford immobility and (3) allow of unlimited out-of-door exercise, as far as pain or danger to the diseased joint is concerned.

“It is submitted that the apparatus here described (see Fig. 2) meets these requirements. It is made mainly of strip-iron, known as ‘binding,’ and is bent to the form of the body by means of an ordinary monkey-wrench. The main strip should extend from the lower angle of the scapula down over the back, thigh, and leg

on the affected side to within 2 inches (0.051 metre) of the heel. To this are riveted three bands, one to fit loosely around the body just below the armpits, a second at the knee, and the third at the ankle. A spring reaches from the crest of the ilium down over the outside of the thigh to the knee, to which is attached a wide, soft, padded band passing around inside the thigh, by means of which all the lateral traction which the patient will tolerate is exerted. Extension in a line with the body is had from adhesive plaster applied to the leg and counteracted by a leather belt around the waist, to which the loose iron body-band is looped. The power of both extensions being equal, the mean extension will be seen to be in an axis with the neck of the femur.

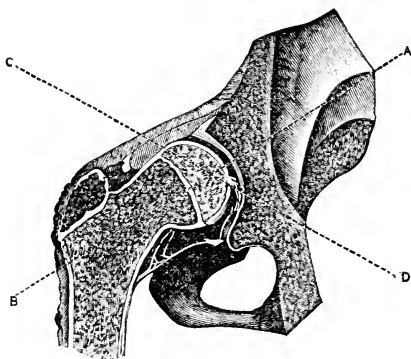


FIG. 1.—VERTICAL SECTION THROUGH HIP-JOINT OF A CHILD. (AFTER MORRIS.)

A to B indicates the direction in which the extension here described is made, and C to D the direction in which the head of the femur is carried by extension in a line with the body.

(*Chicago Medical Journal and Examiner.*)

“The main strip down the back, thigh, and leg secures nearly complete immobility, and I have come to look at this as almost as necessary as in fractures. The surface of the splint next to the body is padded and the whole instrument is covered with sheep-skin. A patten or cork sole is placed under the foot of the unaffected side, of such thickness as shall prevent the other foot from touching the floor. The patient is given a pair of crutches and told to take all the exercise in the open air that his general condition will permit. The splint should be molded perfectly to the form and be painless to wear, or it has not been properly applied. The joint is now protected from jar or concussion and both factors of

friction are largely overcome. The adduction of the leg with the accompanying lordosis, which is nearly invariable as the disease progresses, and which is due to the unrelenting tonic contraction of the adductor muscles, is, in most cases, nearly or quite overcome on the application of the lateral tension band. As the adductors relax and the leg falls into the natural line with the body, the upright section of the splint should be straightened so far as to conform to the improved position."

By the addition of *traction* to the Thomas splint in the two directions, as advised by Blanchard and also by A. M. Phelps,¹_{Aug. 31} it will make this a safe and valuable instrument in the treatment of hip disease. But *without traction*, even with its so-called perfect immobilization, it is more frequently followed by abscess than the cases that are treated by the usual traction-splints, some of which even allow very slight motion, which, if it can be done *without friction or pain*, does no harm.

Traction *in the line of the axis of the neck of the femur* can be easily applied to any of the various long traction-splints that are worn on the *outer* side of the limb by simply passing a handkerchief or bandage around the inner side of the thigh and securing it firm on the outer bar of the long hip-splints. We have done this for years with great satisfaction.

John H. Huddleston, of Boston,⁷⁶⁰_{Oct. 19} read a paper, entitled "An Analysis of Twenty-one Cases of Hip Disease Treated by the Thomas Splint," before the American Orthopædic Association, held September 17th to 19th. He said the splint had been applied in



FIG. 2.—BLANCHARD'S APPARATUS.
(Chicago Medical Journal and Examiner.)

the Boston Children's Hospital by men some of whom had seen Thomas's clinics, and others who had carefully studied the directions given by Thomas on the hip, knee, and ankle. Special malleable iron for the material of the splint had been obtained, and great pains taken to make the appliance really a Thomas splint. Of the 21 cases, satisfactory notes have been obtained in 14 and notes sufficient to explain the use and the result of the splint in 5 more. One patient died shortly after the application of the splint and 1 has not been heard from.

Before summing up the results, it may be added that it has been found difficult to fit the splint and more difficult to keep it in place after fitted. Of the 14 patients whose histories are long enough to be valuable in estimation of the splint, 9 had abscesses; at least 9 had elevation of the trochanter above Nélaton's line; 11 had shortening of an inch (0.025 metre) or more; 8 had atrophy of the thigh of more than 2 inches (0.051 metre); 5 had 5 degrees or more adduction; 8 had some flexion; 6 had no motion at the joint; 4 had motion of only a few degrees; 3 had a good amount of motion; 1 had perfect motion; 6 were brought into the hospital for correction of deformity or relief of pain.

Finally, the character of the results obtained is shown by the table to be, in a broad way: Good position with little flexion and adduction, but great shortening; great atrophy; and very constant elevation of the trochanter above Nélaton's line, with a remarkable percentage of abscesses.

Bernard Bartow, of Buffalo, ⁵⁹_{Oct. 19} also read a paper on the immediate disregard of malposition of the thigh in the treatment of hip disease. He employed the following method in the earlier stages of the disease. It was a fixative dressing of plaster of Paris, which was applied while the patient was suspended, as during the application of the plaster jacket in spondylitis. The well foot is allowed to rest on a block from 4 to 6 inches (0.10 to 0.15 metre) in height, so that the affected limb will, by its own weight, exert traction upon the muscles about the hip-joint. The plaster of Paris is applied over the trunk, hip, and leg, extending above to the sixth rib and below to the middle of the leg. The dressing is strengthened by strips of thin, malleable steel. No attention is paid to the malposition, which is gradually overcome by the weight of the leg as different splints are applied, the rest afforded the

joint during these intervals removing each time much of the spasm. The author reported his cases and showed photographs of them. If the patients thus treated were put on long crutches, with a "patten," or high-soled shoe, on the *well* limb, and a pound (500 grammes) or more of lead attached to the heel of the shoe on the *diseased* limb for *traction* by day, and a gaiter with weight and pulley for *traction* by night, this would be a very efficient mode of treatment, and especially applicable to the country practitioner, who was not near the instrument-maker.

The New York Academy of Medicine discussed ¹_{Aug. 31} the management of hip-joint disease from an anatomical basis. Phelps believed, in regard to pathology, that it was a local tuberculous affection, due to accidental inoculation and not to a constitutional or strumous condition. Following Volkmann, Albert, and König, he believed that the inflammation, at first simple, became tubercular by inoculation and then purulent. The irritation of the peripheral extremities of the nerves in or about the joint produced muscular spasm, which, in turn, distorted the joint by trauma, aided by the bacilli of tuberculosis. In regard to treatment, he relied on mechanical treatment, believing that if we immobilized a joint and removed the intra-articular pressure, nature would take care of the tuberculous material. He believed that the muscular spasm, which was a most serious element of destruction, should be overcome by extension, and that, while extension was necessary to secure immobilization, it was not sufficient by itself. He therefore resorted to a combination of extensions and fixations, the extension always to be in a line corresponding to the axis of the neck of the femur. Treatment, as a rule, should be begun in bed, extension being made in two directions, *i.e.*, toward the foot-board and laterally, the body and the sound leg being fixed to a long splint extending to the axilla. If the deformity did not yield to extension properly applied, the tissues at fault should be divided subcutaneously or by open incision. Abscesses were to be incised through their entire length, and thoroughly scooped out and washed, strict antiseptic precautions being observed. Distention of the capsule should be relieved by aspiration or incision; then traction would not produce pain.

He exhibited a patient in a portable bed, which was an ingenious substitute for the wire cuirass, made with a board cut in

an outline of the body and plaster of Paris. The child was laid on the board, and then the whole was enveloped with plaster-of-Paris bandages from the foot to the axilla. The plaster was then cut away from in front, the interior comfortably padded, and the patient held in place by lacings or bandages. Extension and fixation in bed were to be continued until the active symptoms and the deformity had entirely disappeared and the spasm of the muscles

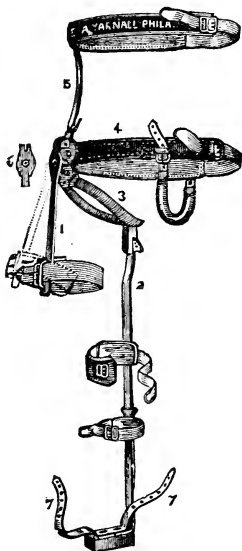


FIG. 1.

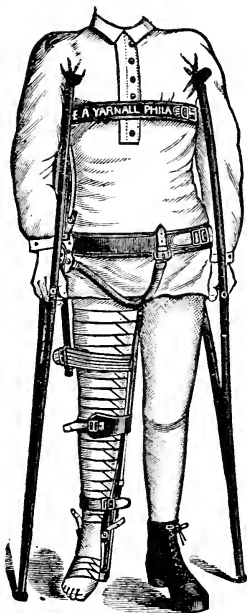


FIG. 2.

Fig. 1 represents the perineal crutch with the abduction bar (1) adjustable by means of the key (6), for the purpose of making lateral extension. The steel bar (2) is adjusted to the steel ring (3), which makes a firm crutch, the pressure coming on the tuberosity of the ischium. Adhesive straps, extending to near the body from the ankle, furnish means of extension by tightly buckling them to the straps (7, 7), the ring (3) furnishing counter-extension. The rod (5) ending in the upper ring prevents flexion and extension of the legs. The whole splint is intended to prevent every motion of the hip-joint, and at the same time apply extension in a line with the neck of the bone. Fig. 2 shows the crutch and splint adjusted, the patient using crutches and standing on a high shoe upon the well leg.

was no longer present. Adults were then given crutches, and a portable splint which had a perineal crutch extension by adhesive plaster, an abduction bar, and an upper (thoracic) ring to prevent flexion and extension at the hip. Children, after treatment in bed, were to have the portable bed, and then the portable splint, with or without the high shoe and crutches.

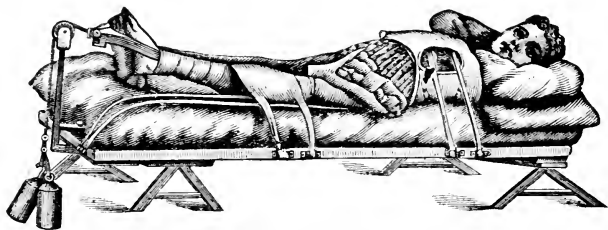
J. Ridlon was much pleased to hear the author of the paper take the ground that hip cases should be cured without deformity. He recalled the case of a patient in whom the muscular spasm had been relieved by pinching the muscle. Shaffer said that the paper had suggested to him the importance of separating in our minds the disease from the deformity. It was a question how far we were justified in meddling with the deformity, which was simply an expression or, so to speak, a symptom of the disease. In his experience, attempts at speedy reduction of the deformity had been followed by disastrous results. He believed that if the joint were protected from traumatism—in other words, if traumatic contact of the inflamed joint surfaces was removed, and this could readily be done by the use of portative apparatus without entailing immobilization of the entire body from the head down—the joint was placed in the best-known local condition. The portative-traction treatment was compatible with fresh air, sunlight, and moderate exercise, which were the best means of combating the tubercular disease and the tubercular diathesis. More lives had been saved and better results had been thus secured than by any other method which had been thoroughly tested. R. H. Sayre agreed with Shaffer as to the importance of maintaining the general health and the inadvisability of general immobilization of the body if the diseased joint could be controlled without it. He thought that complete immobilization of the hip-joint in young children was very difficult to secure, and that the movement that stopped short of producing muscular spasm and pain was not hurtful. For poor children particularly he thought the portable bed was an admirable contrivance. The relief obtained in some cases by pinching the muscle could be explained on the supposition that it stopped the reflex action of the muscle. It was known that firm constriction of the belly of a muscle would, in certain cases, abolish spasm.

At the meeting of the American Orthopædic Association in September, N. M. Shaffer, of New York, ⁵⁹_{Oct. 19} read a paper on "The Principles of Treatment of Hip-joint Disease." He held that hip-joint disease is a tubercular disease characterized by an insidious invasion, by a limp, and by a muscular splinting of the diseased joint. The muscular splint, acting in the direction of the long diameter of the muscles, made a direct interarticular pressure, and was nature's method of affording protection to a diseased joint.

Shaffer illustrated the action of traction in protecting a diseased hip by calling attention to the effect of manual traction in a child suffering acutely from hip disease, and he further illustrated the subject by showing that it subjected the patient to severe pain if we used the lever principle, making the joint a fulcrum to overcome the muscular deformity, thereby still further increasing the interarticular pressure. He spoke only on the general principles, and mentioned no particular form of apparatus. He stated that his experience had led him to say that the lever principle of treating hip disease was crude and unscientific. Certainly, it was not the correct mechanical principle to apply to an already overburdened and overtaxed joint; and that true rest, real immobilization, and perfect fixation, when these elements were required in the treatment of hip-joint disease, were best obtained by some form of apparatus employing the traction principle. R. H. Sayre, of New York, at the same meeting, discussed excision of the hip. He said that with proper mechanical treatment, commenced early in the disease, and with good hygienic surroundings, the vast majority of cases recover without excision, and recover with limbs as good or better than those resulting from excision. The primary focus of the disease is usually so situated that it cannot all be removed without excising the joint. About half the primary excisions relapse, a number are followed by general tuberculosis, and the result is not equal to that of mechanical treatment. Therefore do not excise in the onset of the disease. The development of an abscess is the last step in nature's process of exfoliating the diseased tissues, and in such cases to excise is a mistake, and the abscess alone requires treatment. In other cases, however, the patient, in spite of treatment, does badly, and it is in such cases that it is necessary for the surgeon to interfere and excise the joint, not delaying until the patient is worn out with fever and suffering from amyloid changes. But, even in such cases, when the diseased tissue is removed, the patient may recover. The author then gave the technique and the after-treatment of the operation.

Flament, of Lille, ²²⁰_{Dec. 21, '88} reports 6 cases of coxalgia successfully treated by continuous extension, combined with Lannelongue's immobilization apparatus, attached to a *portable bed*; 1 was in the first stage, 2 in the second, and 3 in the third stage of the disease.

He says "it was noticed that when confined in the wards for several months the patients gradually pined away, from being deprived of fresh air and sunlight,—two of the most important elements toward a speedy and complete recovery." He therefore places the mattress on which the child rests, on a board of equal dimensions, to which is attached the straps of Lannelongue's corset. The support for the weight and pulley is at the end of the board. "The extension is applied according to Sayre's method by means of a single strip of diachylon plaster, 3 centimetres (1.18 inches) broad, which starts from the internal and upper portion of the thigh, passing under the sole of the foot and up the outside of the leg to the great trochanter. This is secured by a roller bandage, from the instep to the middle of the thigh, when the ends of the diachylon plaster are reversed and the roller bandage carried back



LANNELONGUE'S IMMOBILIZATION APPARATUS.
(*Journal des Sciences Médicales de Lille.*)

over the plaster thus reversed, causing them to adhere strongly together, so that it will endure the greatest amount of constant traction, even in the heat of summer, without giving way.

"In this apparatus, on fine days, the patients were carried out in the open air, which is, without doubt one of the principal causes of the excellent results obtained." (See figure.)

Vincent, of Lyons,²¹¹_{Dec. 8, '98} publishes an interesting case of an extensive psoas abscess following the treatment of hip disease in a fixed position by silicate bandage, which perfectly immobilized the hip-joint, but resulted in an extensive abscess, completely filling the iliac basin, and which he relieved by trephining the ilium, and enlarging the opening in the bone by the gouges gave free exit to the pus and had a favorable result.

The senior editor has seen a similar case of perforation of the acetabulum, with extensive intra-pelvic abscess opening above the

pubis, in a case of hip disease treated by plaster-of-Paris *immobilization*, but *without traction*. The limbs being held parallel by the plaster bandage, the usual deformity of hip disease did not occur, and therefore the attending surgeons would not admit that the joint was diseased because of the absence of the usual deformity, and because direct upward pressure produced no pain. He *exsected* the hip-joint, assisted by his son and Yale, in the presence of Krackowitzer, Markoe, Henry, and the two Sabines. The head of the femur was nearly destroyed; what remained was passed into the pelvis through a large perforation in the acetabulum. The internal periosteum was much thickened and peeled off from the ilium, making the boundary of a large abscess which had opened some months previously over the top of the pubis. The child made a rapid recovery and was able to ride on horseback in a few months.

This case had been *immobilized* in plaster of Paris for two years,—in fact, from the very earliest stage of the disease,—but, as *no traction* was applied, the reflex muscular contraction, which always accompanies chronic inflammation of joints, caused direct upward pressure, resulting in absorption of the head of the femur and perforation of the acetabulum.

Ollier, of Lyons, ³_{May 15} advises, in suppurative coxalgia, to first treat them by the employment of proper apparatus for a long time; but if the disease continues to progress, then to *exsect* and seek to *ankylose* the joint, which he thinks more satisfactory than to recover with motion, as the limb, he says, is more useful for hard work and less likely to have relapses.

The senior editor has seen a number of cases of resections of the hip that have recovered with very good motion. One, Dr. A. N. Roussell, of 143 Stuyvesant Avenue, Brooklyn, has almost perfect motion; can run, dance, skate, and walk many miles without the slightest fatigue, although more than 3 inches (0.076 metre) of his femur and much of his acetabulum are in the senior editor's museum; yet he has only $\frac{3}{4}$ inch (0.018 metre) shortening of the limb.

Noble Smith, ⁶_{Feb. 19} in cases of coxalgia, recommends *drilling the bone* in the neighborhood of the joint, as advised by Kilpatrick, of Dublin, in 1867, Greig Smith in 1881, William Stokes in 1886, and Thornley Stoker, and concludes as follows: "As far as my experience is concerned, *drilling* has produced an almost immediate and permanent benefit, and, in conjunction with *absolute fixation* of

the joint (no easy matter), it is an operation which should be performed without delay in every case where fixation has not given relief. The plan pursued is to puncture with a scalpel to the bone, dividing the periosteum $\frac{1}{8}$ to $\frac{1}{2}$ inch (0.009 to 0.013 metre), drilling for $\frac{1}{2}$ inch (0.013 metre) or more into the bone, and syringing with a solution of carbolic acid (1 to 40). The subsequent treatment depends on circumstances, but in sufficiently early cases the wound can be closed at once and healed in a few days."

V. P. Gibney, ¹_{Feb. 2} in a paper on the immediate correction of deformities resulting from diseases of the hip, after referring to the dangers of acute suppuration following the attempts to correct ankylosis of the hip by *manual force*—as reported by E. Miller, of Tübingen—and the 4 cases reported by Aberst as having occurred in Volkmann's clinic following *brisement forcé*, he suggests a combination of *tenotomy*, *myotomy*, and *osteotomy* in addition to the manual force required to improve the position of the limb, one or all combined when necessary, and to secure parallelism of the limbs at one operation, if possible. To retain the improved position, a plaster-of-Paris bandage is applied over a closely-fitting stockingette, from the ankle to the free ribs, and rest in bed for a week or ten days. In some cases the deformity was so great and the resistance so obstinate as to require a second and even a third operation. When abscesses existed they were freely opened and every sinus was freely curetted. The plaster-of-Paris bandage was continued for a few weeks, and then a long hip-splint was applied for traction of the limb and to protect the joint. After describing the minute details of 8 cases thus operated on, and exhibiting very satisfactory illustrative photographs of the same, before and after the operation, Gibney says: "In no single case that I have operated upon, has any acute joint suppuration followed."

Ap Morgan Vance, of Louisville, Ky., ²⁶_{Jan.} publishes 8 cases of very severe deformity resulting from hip disease, which he had relieved by femoral *osteotomy*, combined with *tenotomy* and *myotomy*, almost similar to the treatment of Gibney and with equally good results, as was proved by the photographs with which the paper was illustrated.

RACHITIS.

Rachitis, or *rickets*, is a constitutional disease from general malnutritions, its most conspicuous manifestations being in deform-

ities and distortions of the osseous system from softening of the bones. In its later developments the very opposite condition occurs, viz., the bones become unusually hard or eburnated. After this hardening has occurred, of course the deformity can only be relieved by operative interference, either by section or fracture—*osteotomy* or *osteoclasia*; whereas, if treated before the eburnation has occurred, the deformity can be prevented, and often cured even after it has occurred, by proper mechanical support, and the disease arrested by proper treatment.

In 1872 Wegner,⁹_{Oct. 25} studying the physiological action of phosphorus on animals, noted that after its continuous administration the bones were much more dense, in some instances the cancellous tissue and medullary canal being entirely obliterated. These effects have been confirmed by other observers, and denied only by Kissel, of St. Petersburg, whose observations are open to criticism. Wegner's observations led to the logical deduction that phosphorus would be found a valuable drug in rickets. The clinical studies of Kassowitz, Friese, Jacobi, Montmolli, Hartwitz, Hochsinger, and, recently, of Anna Schabanowa, have confirmed the opinion of Wegner.

Henry W. Berg,⁵⁹_{Nov. 16} reports some cases of typical rachitis, accompanied with almost complete paralysis of the lower extremities, some of the cases being unable even to stand, that had entirely recovered in a few months, under the use of phosphorus, electricity, and massage. He uses Thompson's solution, as made by Hazard and Hazard, which contains $\frac{1}{20}$ grain to a drachm (0.003 to 3.90 grammes) and has no odor of phosphorus. The formula used by this firm is as follows:—

R. Phosphori,	.	.	.	.	gr. j	(0.065 gramme).
Alcohol. absolut.,	.	.	.	.	℥cccl	(21.56 cubic centimetres).
Spt. menth. pip.,	.	.	.	.	℥x	(0.62 cubic centimetre).
Glycerinæ,	.	.	.	.	℥ij	(62.20 grammes).
M. and Sig.						

Of this mixture he gives to a child, 2 to 4 years of age, 6 minims (0.37 cubic centimetre) t. i. d., to be increased 1 drop weekly until 10 drops are given; larger doses he does not think necessary. For younger patients correspondingly smaller doses will be best.

With the steadily accumulating evidence at hand, it can be said that phosphorus has reached a permanent place in the thera-

peutics of rickets; but it should never be forgotten that there is no specific for this disease, and that all drugs are of secondary importance to the general and dietetic management of each individual case. Phosphorus should be administered in small doses in an oily solution or emulsion. The possibility of fatty degeneration of the liver, as pointed out by Wegner, should not be forgotten; and Hartwig, fearing this, advises occasional withholding of the drug to avoid danger. We believe no case has as yet been reported in which ordinary therapeutic doses caused degeneration, but, nevertheless, it may be well to bear such a possibility in mind when administering the drug for any great length of time.

F. Levison, of Copenhagen, ³⁷⁵_{Nov. 10} our corresponding editor, states that Hegent had frequently observed in the zoological gardens that the young mammals, and sometimes the older carnivorous animals, were frequently affected with a disease precisely similar to the rickets of children, when they had been fed for some time on food that did not contain a sufficient amount of oil or grease, and that upon restoring the oily food they soon recovered. He therefore recommends very strongly cod-liver oil and butter as a food for rickety children.

In support of the idea that fat is an essential article of diet in curing the rachitis, we quote from Cheadle, ²_{Nov. 24, '88} who cites the experiments in the feeding of the young animals in the Zoological Gardens, London. A single example will illustrate: The usual diet of the lion cubs was especially deficient in fats and the earthy phosphates, and the feeding of the last litter of lion cubs was commenced in the usual way. "They quickly developed marked rickets and one died. Then, at the suggestion of Bland Sutton, the diet was changed. The meat was continued, but in addition to it cod-liver oil and pounded bones were given with milk. No other alteration whatever was made in any way. In three months all signs of rickets had disappeared; and now, at 18 months of age, they are perfectly strong and healthy and well developed,—a unique event in the history of the society." He sums up the general pathology of ordinary rickets thus:—

1. It is primarily a diet disease which can be caused at will by a rachitic diet just as certainly as scurvy by a scorbutic diet, and which can be cured as certainly by an antirachitic diet as scurvy by antiscorbutic diet.

2. That the chief defect in diet which causes rickets is want of animal fat.

3. With this, probably, also deficiency of the earthy salts in form of phosphates.

4. A deficiency of animal proteids in conjunction with the preceding intensifies the condition.

5. The rickety state is accentuated by evil hygienic conditions, such as foul air and want of light, although these are not essential to its production.

6. Rickets is modified in character by the concurrent existence of congenital syphilis and of scurvy.

7. That the treatment is primarily and chiefly dietetic, and that drugs are of minor import, though lime and lime-salts, warm clothing, fresh air, and sunlight, in conjunction with proper diet, may do good service.

H. C. Dembitz, ²²⁴_{Aug. 31} after referring to the statistics of Snow, Freer, Jacobi, and others, to prove that rickets is much more frequently found among children in America than has hitherto been believed, recommends very strongly the use of phosphorus in its treatment. It is given either in solution or in an oil, as cod-liver oil, or, to avoid mistakes due to the improved nutrition from the oil, it may be prescribed thus: \mathcal{R} Phosphori, gr. $\frac{1}{4}$ (0.016 gramme); carb. bisulph., gtt. vj ; aq. dest., $\mathfrak{z}\text{iv}$ (124.41 grammes).—M. Teaspoonful daily, or half as much twice daily, after feeding. The results are particularly good after the first year, and under this treatment the Germans, who have used it in their clinics for several years, report renewed growth of long bones, the ribs grow and the chest expands, the teeth appear, fontanelles close, and cranio-tabes is cured, and thus the whole condition is often changed in four to eight weeks. And that, as Toplitz remarks, "without change of lodgings, which is impossible in polyclinic cases." Up to the time when phosphorus was used, general tonics—iron, cod-liver oil, arsenic, and improved feeding—had been generally used. The last named is, of course, important under all circumstances.

The following is a brief *résumé* of the present views, on which nearly all authors are united: 1. That the disease is very common all over the temperate zone, especially so where the climate is damp and variable, and particularly among children living in damp, cold quarters, and begins oftenest in fall and winter. Ritter, in Prague,

said 31 per cent. of his polyclinic children were rachitic, and Henoch, further north, at Berlin, says his figures are higher. 2. Any cause that weakens—first of all, bad feeding—predisposes to the disease. (Some still regard this as the prime cause.) So, also, chronic diseases and acute febrile diseases are likely to be followed by rachitis in infants, if convalescence is not prompt. 3. The characteristic process is in the bones, but the cause of this process is not yet understood. 4. The cases should be readily diagnosed; pressure on the sides of the thorax, walking, and other mechanical influences likely to increase deformity, should be avoided. 5. When the infant can go to a balmy climate, that would, perhaps, be best; otherwise, dry, warm quarters and good feeding should be ordered if possible. 6. Besides these, if possible,—if not, without them,—administer phosphorus, and in some cases iron, in others pepsin or similar remedies, as indicated. Lukewarm washing, gradually cooling off, and brisk friction afterward improve the circulation and the function of the skin.

Robert J. Lee ⁶_{Dec. 15, '88} claims that some pulmonary trouble generally *precedes* the development of rickets in children, and then gives a table of 50 cases, ranging from 11 months of age to 3½ years, all of which are minutely detailed, and in every case it had been preceded by some pulmonary trouble.

Snow ⁵⁹_{June 15} has made investigations in Buffalo to determine the truth of the statement commonly made by physicians that rickets is essentially a European disease, and is rare in America. The author examined 25 children under 3 years of age at the Fitch Dispensary, and 10 presented well-marked symptoms of rickets; in two orphan asylums 33 children under 3 years of age were examined, and no less than 13 were rachitic, or, altogether, 40 per cent. All the children who labored under this affection were, with 3 exceptions, of foreign parentage, and all were either brought up artificially or, if nourished at the breast, were given starchy foods in addition.

Osteotomy for Anterior Curves of the Leg-Bones.—DeForest Willard's extensive familiarity with this class of surgery justifies him in concluding thus ¹⁹_{Jan. 19}: "1. Anterior tibial curves during the soft and spongy stages may be corrected by manual rectification and the use of apparatus. 2. Braces are useless after hardening has occurred. 3. Manual fracture is the best and safest remedial

operation in young children. 4. Osteoclasis is not as safe or effective as osteotomy. 5. Aseptic simple osteotomy for all moderate degrees of curve and cuneiform section for very severe grades give almost uniformly good and speedy results, without suppuration. Subcutaneous section by the saw is also a reliable operation."

John A. Wyeth¹⁰¹_{May} reports 8 cases of osteotomy for deformity of the lower extremity and one of excision of the knee, and concludes his report as follows: "By way of summary, as far as these

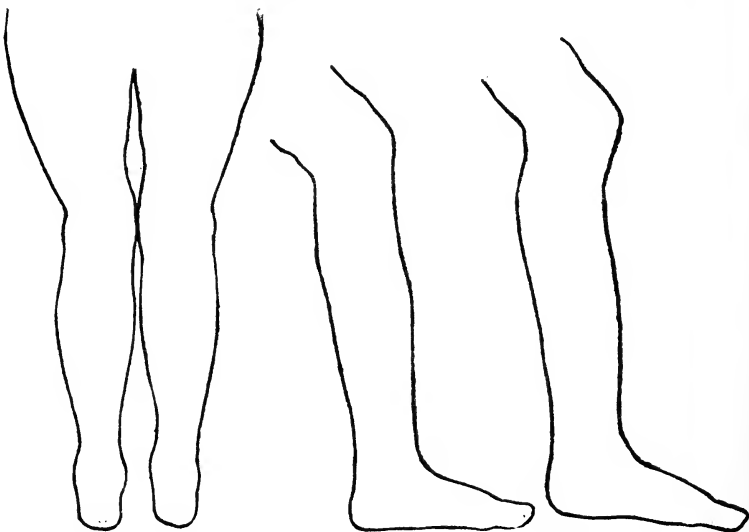


FIG. 1.

FIG. 2.

(*Boston Medical and Surgical Journal.*)

cases are concerned, it may be said (1) that osteotomy for the correction of deformity is practically devoid of danger, and that it accomplishes in a few weeks results which mechanical appliances would require years to achieve; (2) that cuneiform tarsotomy is practically the only means now known for the more perfect restoration of the foot in severe forms of talipes equinovarus, in which the tarsus is ossified in malposition; (3) that excision of the knee in modern surgery is rarely fatal, and should be employed in all cases of destructive osteo-arthritis of this joint, and to correct

deformity due to ankylosis in bad position. In my experience no case of death has occurred after this operation."

Joel E. Goldthwaite⁹⁹_{Oct.3} reports the ultimate results of osteotomy and osteoclasis in 28 cases, one year and a half after the performance of the operation. Fifteen were cases of osteoclasis, 12 of osteotomy, and 1 a case in which both operations were performed. He says that perhaps the present condition of these patients may be better appreciated from the diagrams herewith. Fig. 1 represents a composite of the tracings of the 27 cases, as

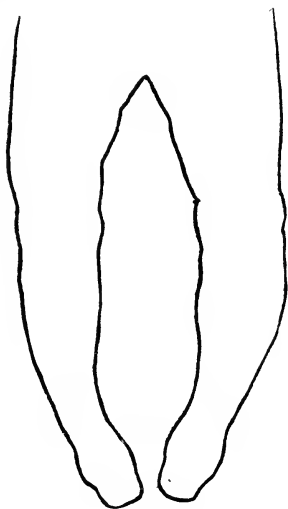


FIG. 3.

(*Boston Medical and Surgical Journal.*)

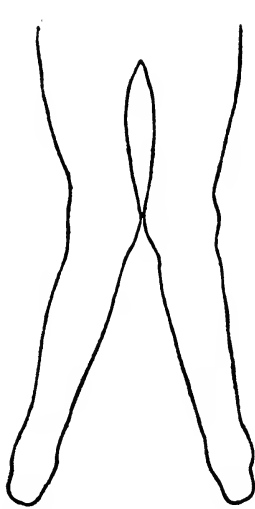


FIG. 4.

seen from the front. These tracings are taken as follows: First, the simple tracing of each case is taken; that is, the child sits upon a piece of paper with the internal malleoli or knees together, according as it is a case of bow-legs or knock-knee, and with a pencil, held perpendicular to the paper, the outlines of the legs are traced. These tracings are then reduced to a common size, and are reproduced till all of the tracings are drawn upon one piece of paper, one over the other. From this what represents the average of all of these is drawn, and is termed the composite tracing. Fig. 2 represents a composite tracing of the results in 5 of the above

cases, in which the deformity had been an anterior bowing of the bones of the lower leg. These tracings are taken with the legs lying upon the side. Fig. 3 represents the composite of the tracings in 10 cases of bow-legs before operation. Of course, among these cases, as well as among the cases of knock-knee, were some in which the curve was very extreme, while in others the deformity was so slight as to render an operation questionable. Fig. 4 is a composite of 5 cases of knock-knee. Fig. 5 is a composite of 3 cases of anterior bowing of the tibia. Eighty-five per cent. of the cases operated upon were under 7 years of age, or an average age

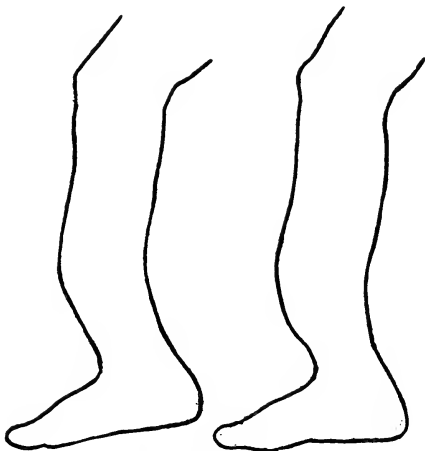


FIG. 5.

(*Boston Medical and Surgical Journal.*)

of operation of $4\frac{1}{2}$ years. Referring to the authorities for an opinion as to the operable age in these cases, one finds: E. Noble Smith,¹¹¹⁸_{p. 208} in considering operative interference for the correction of the rachitic deformities of the lower legs, says: "To perform osteotomy upon cases that can be cured by more simple means is contrary to sound surgical principles, and the frequent performance during the last few years of this operation upon children between 4 and 12 years of age has called forth strong condemnatory expressions from many surgeons of high repute. Up to about 12 years of age, and even beyond this period, simple curvatures and genu valgum may be nearly always cured by pressure alone."

Ogston¹¹¹⁹_{p.83} says: "Most cases of knock-knee, under puberty, are curable without a cutting operation." Adams¹¹¹⁹_{p.83}: "Osteotomy should not be performed upon very young children; for them, splints, bandages, and constitutional treatment should suffice." Barker¹¹¹⁹_{p.84}: "Will not operate earlier than the sixth year." Macewen¹¹¹⁹_{p.84}: "Will not operate on any patient under 9 years of age, at least; and would prefer them to be 15 years of age, or more." Barwell¹¹¹⁹_{p.84}: "Will not operate before the seventh year." A. W. Mayo Robson²_{Jan. 19} reports 53 cases, in which 3 were operated upon at the age of 3 years, while the average age was $11\frac{1}{2}$ years. Chotzen⁹⁷_{No. 23} reports the ultimate results of 22 cases in which the age of operation varied from 15 to 19 years. The ultimate results in these cases were universally good. Macewen¹¹²⁰_{p.73} reported 1118 cases, drawn from the practice of 37 surgeons, including American, English, and Continental, in which the ages of operation varied from 3 to 39 years. In this same paper, in speaking of the ultimate results, he says he has known 2 cases to relapse where there were anterior curves to the tibia in young children, and 1 case after his method of supra-condyloid osteotomy.

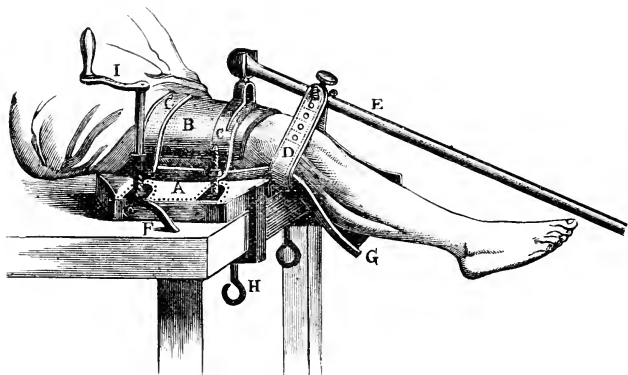
It will be seen from this that osteotomy and osteoclasis is performed at the Boston Children's Hospital at a much younger age than is considered allowable by many of the standard authorities; and yet, after a considerable period of time, only 1 case out of 28 has relapsed, and that a case in which acute rachitic processes were present after operation.

To summarize, in conclusion: 28 cases are reported,—15 cases of osteoclasis, 12 of osteotomy, and 1 case in which both operations were performed. The average time which has elapsed since operation is four years. Of the 28 cases, 27 are found in excellent position, while 1, a case in which the rachitic processes were active after operation, has relapsed. The average age of operation was 4 years, while the youngest child was operated at the age of 2 years, and the oldest was 10 years of age. Double talipes valgus was found in 14 cases and single in 2 cases, and a tendency to toe-in was also a frequent occurrence.

The Osteoclast as a Means of Re-dressing Deformities of Limbs.—Kenneth M. Douglass.³⁶_{Apr.} after describing the dangers following the use of the various osteoclasts hitherto used, gives the highest praise to the "*osteoclasie sus-condylienne*" of Robin, which acts

upon the femur alone, producing a transverse subperiosteal fracture, at *any point* selected, without wrenching any joint above or below the point of fracture. Robin's apparatus is a simple but most effective one, by which the strongest bone may be broken without any other injury being sustained by the limb.

The osteoclast (see figure) consists of a square plate or table (A), a steel plate (B) shaped so as to lie in apposition to the extensor aspect of the limb, two similarly-curved steel collars (C), a leather strap (D), and a powerful lever (E). As may be seen in the figure, the thigh rests upon the square table, which must be firmly fixed to the operating-table by means of a clamp (H). This square is



ROBIN'S OSTEOCLAST.
(*Edinburgh Medical Journal.*)

inclined downward and forward, so that when the patient is recumbent it supports the thigh *in all its length*. It is, further, capable of being lengthened or shortened, in virtue of a sliding action between two superimposed plates, of which it is composed. It must be covered, when used, by a sheet of leather (G) projecting beyond its upper margin, which is hollowed out to receive the buttock. The leather must also project beyond the lower margin, to protect the skin from injury during the operation. The steel plate (B) is likewise covered on the inner surface with leather, and embraces the thigh. The steel collars are intended absolutely to fix the thigh, which they do by being applied over the upper and lower borders of the plate (B), and, being screwed down to the

square plate on which the thigh rests until between plate (A) and plate (B), the limb is held as in a vice. The screws are tightened by means of a handle (I), which is so constructed that at a certain point, naturally varying in each case, the apparatus can be no further tightened and the operator knows that the limb is fixed, while no injurious pressure can be exerted. The leather belt is applied outside the sheet of leather, behind the condyles of the femur, and its two ends are fastened as short as may be to hooks, one on either side of the lever. This lever finds a fulcrum on the middle of the lower steel collar, where it is fixed. The osteoclast being applied and the thigh grasped, the handle of the lever is carried upward by a gradual and continuous effort till the femur yields, with or without an audible snap. The limb is then held by an assistant, and the whole apparatus at once disengaged by turning a handle (F). The bone always breaks at the lower edge of the anterior plate (B), so that the surgeon can accurately determine where the fracture shall occur.

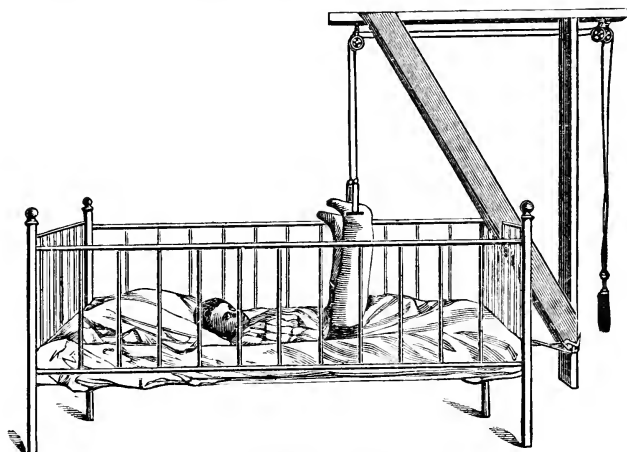
The points on which Robin mainly insists are: 1. That the *whole length* of the thigh rest on the posterior plate, in order that rotation and consequent obliquity of the fracture may be prevented. 2. Absolute fixation of the thigh, that one may have certainty as to the point of the fracture. Robin points out that the soft tissues are not injured in virtue of the spring arrangement alluded to in the handle, and also that the vessels and nerves, being displaced inward, are not greatly compressed. The condyles also protect them. 3. The limb must be held extended while the screws are fastened down, to prevent any dragging upon the skin.

One can say with truth that this instrument of Robin's fulfills the two conditions laid down by him in its conception. The knee-joint is beyond its sphere of action, and the femur, which alone is injured, is fractured subperiosteally and transversely; the fracture may be complete or incomplete, at the will of the operator, so exactly can the force applied be estimated and controlled.

A. W. Mayo Robson,^{2 Jan 19} reports a series of 84 *osteotomies* performed on 54 patients, in which recovery took place in every instance, and that only 9 out of the 84 operations needed a second dressing, the dressing first applied being one of salicylic or "salufer" wool held in position by a gauze bandage. All the operations were performed under strictly antiseptic rules.

Charles N. Dixon Jones, of Brooklyn, ⁹⁶_{Apr.} reports 158 consecutive osteotomies for rachitis without suppuration. The operations were all performed after the plan of Macewen, of Glasgow. Jones dusts the wound with iodoform and covers with a strip of Lister's protective. The limb is then enveloped in a mass of sublimate gauze and absorbent cotton and neatly bandaged. After both limbs are dressed a plaster bandage is applied and the limb is suspended, as in the cut,—a method which will be found to be of very great advantage.

Charles E. Bruce ¹⁰¹_{Aug.} describes a brace for the correction of bow-



DIXON JONES'S METHOD OF SUSPENSION.
(*Annals of Surgery.*)

legs. As can be seen in the engraving on page 29, the brace consists of three pieces of thin, flat steel, with joints corresponding to the ankle- and knee- joint, and is to be placed on the inside of the limb. The first segment of the instrument extends from the sole of the shoe in front of the heel to the ankle-joint, and is riveted to the sole of the shoe. The second segment, a narrow strip of stiff steel, having a curvature which approximates in degree to that of the deformity to be corrected, only that it is in the opposite direction, extends from the ankle-joint to the knee-joint. The third segment extends a short distance above the knee-joint upon the thigh. Its end is furnished with a half-collar riveted at right angles

to the shaft. This curved piece serves to keep the splint in position on the limb. I frequently have a buckle and strap attached to the collar to secure the upper segment to the thigh. The brace is secured to the entire limb by an ordinary roller bandage. Beginning at the ankle, the bandage is carried around the limb, over the brace, the latter being drawn close to the limb, as shown in the left lower extremity of the figure. Instead of using a roller bandage to secure the apparatus in position, an elastic stocking can be employed, which is both easy of adjustment and comfortable to wear. The stocking, if used, should extend from the ankle-joint to a point just below the knee-joint. The elastic stocking furnishes a constant and yielding traction, which is easier borne than the stiff force of a roller bandage.

POTT'S DISEASE.

S. Weir Mitchell, ⁵_{May} after narrating a number of very interesting cases of Pott's disease, accompanied by paralysis, which had been treated by suspension, after the plan first proposed by his father, J. K. Mitchell, in 1826, says: "My conclusions are that suspension should be used early in Pott's disease; that, used with care, it enables us slowly to lessen the curve; that in these cases there must be, in some form, a replacement of the crumbled tissues; that unless there is great loss of power the use of the spine-car or chair, etc., of John K. Mitchell, enables suspension, especially in children, to be combined with some exercise; that no case of Pott's paralysis ought to be considered desperate without its trial; that suspension has succeeded after failures of other accepted methods; that the pull probably acts more or less directly on the cord itself, *and that the gain is not explicable merely by obvious effects on the angular bony curve*; that the now well-known influence of extension in Pott's palsy makes it probable that in other forms of spinal disease, not due to caries, extension in various forms may be of value, as has apparently been of late made clear;



BRUCE'S BRACE.
(*International Journal of Surgery.*)

that the methods of extension to be used in these and in carious cases may be very various, only provided we get active extension; that the plan and the length of time of extension must be made to conform to the needs, endurance, and sensation of the individual cases."

If Pott's disease in any portion of the spine is diagnosticated in its early stages, as it should be before deformity has occurred, and *properly* treated by *suspension*, while a plaster-of-Paris jacket is applied with a jury-mast, to which is attached a cross-bar *by a very strong elastic band*, from the ends of which bar pass loops around the chin and occiput for suspending the head,—the constant traction of this elastic band frees the inflamed bone from

superincumbent weight, and by giving rest to the diseased structures quiets muscular spasm, thus preventing increase of deformity, and by diminishing the amount of inflammatory exudation saves the cord from pressure, and thus lessens the liability to paralysis. If the deformity has occurred before the treatment is commenced, of

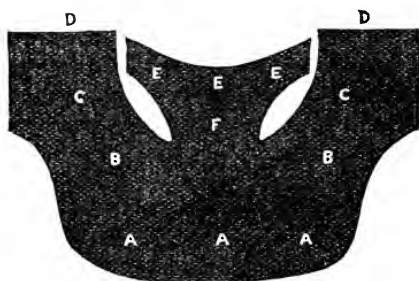


FIG. 1.—FORM OF BROWN-PAPER PATTERN, APPROXIMATELY GIVEN.

A, A, A, part that lies on the chest, the edge being a little above the line of the nipples; B, B, part that lies on the shoulders; C, C, part that lies on the scapulae; D, D, edges that nearly meet, one on each side of the spine; E, E, E, part that lies under the chin and on the rami of the jaw; F, part that lies in front of the neck.

(Lancet.)

course it will remain, but will not increase. The jacket is to be worn with the head extension constantly, night and day, until a cure is effected,—the jacket, of course, to be renewed as often as requisite.

If the child is too small to apply the plaster jacket, on account of its undeveloped pelvis and hips, it must be treated in the *wire cuirass with the head extension* for a year or more, or until the pelvis is so well developed as to allow of the application of the *plaster-of-Paris jacket* and *jury-mast* with the head extension, when it should be substituted for the *cuirass*, as the child can then immediately take active exercise in the open air, which is so essential for the improvement of its general health. We have fully tested this treatment in many hundreds of cases in the

past ten years with the most gratifying results, and without failing to give immediate relief in any single instance.

Richard Barwell, of London, ⁶_{Dec. 1, '88} describes an inexpensive and efficient support for the head in caries of the cervical spine. A pattern must first be cut in brown paper, or some such material, thus: Let us suppose the child to be about 7 years old. A piece of paper—say, 18 inches by 12 (0.46 by 0.30 metre)—is laid, with the long axis transverse, on the neck and upper part of the chest, in such wise that when it is pressed in against the throat and under the jaw its upper anterior edge projects rather more than an inch (0.025 metre) beyond the chin. With scissors the paper is cut in a concave line from the condyle of the jaw downward along its ramus, by the side of the throat, well outside the thyroid cartilage, to a point just above the clavicle and about a third of its length outside its joint with the sternum. These cuts, being completed on each side, permit the flaps of paper that lie outside them to be folded back over the shoulders and scapulæ in such wise that they meet on the spine between those bones. The rest is mere shaping. The part that protrudes beyond the chin and jaw can be cut away to a level with those parts. The edges of the shoulder-flap, if they press on the root of the neck, must be pared sufficiently to allow room for that part. The lappets, which on each side project beyond the shoulders, can be cut away, leaving a concave edge with the centre of the curve upon the acromion. If there be any overlapping at the spine between the scapulæ, the redundancy can be pared off so that the two edges are parallel, and almost, but not quite, in contact. The pattern then assumes the shape seen in Fig. 1.

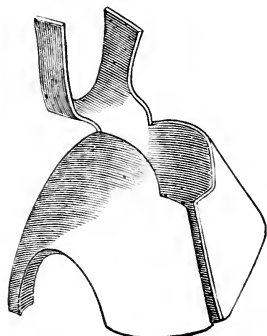


FIG. 2.—FINAL SHAPE OF THE
SPLINT.
(*Lancet.*)

To this pattern is cut a piece of poroplastic felt, which, when softened by heat (steaming is the best), is molded on the patient, partly by hand-pressure, partly with bandage. When thus far complete the splint is of the form given in Fig. 2.

The chin-plate should be lined with wash-leather, and may

advantageously be somewhat padded; to each upper end of the fork two straps are to be sewn, the one to pass round the nape (this in most cases will have to be attached a little below the top of the fork, so as to escape the ear), the other over the vertex; if this latter strap slip forward, the two can be tied together with a tape running in the line of the sagittal suture. Lastly, the felt should be perforated along the edges, which lie by the line of the spinous process, so that the whole appliance may be laced on.

In rather exceptional cases, the head, instead of falling forward, has a backward inclination; such may be met by reversing the mode of cutting the pattern—that is to say, by placing the paper on the back, forming an occipital instead of a maxillary plate, and letting the edges meet and be laced over the sternum; or, if it be desirable to support the head in both directions, this can be done with very little more trouble by shaping a portion in form somewhat like a reversed **L** (**Г**) at each corner, from whence in the pattern the jaw-plate is cut out—that is, at the inner angles of the line marked **D** in Fig. 1.

He says: “As I have successfully treated many cases of cervical spondylitis with this splint, it seems to me desirable to let so inexpensive and simple a contrivance be more widely known.”

A. F. Messiter⁶_{June 15} showed, before the Midland Medical Society, a boy, aged 7, who had suffered from cervical caries for four years. In June he became paraplegic, and soon lost control over his bladder and rectum. In the following October an abscess broke in the right side of the neck. In December he came under Messiter's care, at which time his spine was tender, rigid, and thickened, the head and neck flexed, the chin resting on the sternum. There was a freely-discharging sinus on the right side of his neck; the lower extremities were paralyzed; there was some impairment of sensation, and the urine and feces were passed involuntarily. The head was raised, and kept up by means of a leather collar coming under the chin. In three weeks' time he could walk round the table, the sinus in the neck had healed, and he had regained control over his bladder and rectum. The patient is now fat and well and can run about, though, of course, he wears the collar.

Duret²²⁰_{May 24} describes a case of cervical Pott's disease of four months' standing, in a child, which he relieved by making exten-

sion by the head, while an assistant made counter-extension; and, while the child was held in this position, a plaster-of-Paris bandage was applied over a tightly-fitting shirt, from the middle of the trunk, over the shoulders, around the neck and head (which had previously been shaved), and the child was firmly held in this stretched position until the plaster was "set." Openings were then made in the plaster over the ears and at the top of the head. The child was immediately relieved of all pain, and could take free exercise. The little patient wore this jacket four months, and when removed the improvement was most satisfactory.

Redard⁵⁵_{Apr. 27} gives minute instructions as to the proper manner of applying the Sayre plaster jacket, which he thinks is far superior to any other means of support when properly applied.

W. Arbuthnot Lane²_{Apr. 30} reports a case of complete paraplegia from angular curvature of dorsal vertebræ, cured by *resection of the spinous processes and laminae of the fourth, fifth, and sixth dorsal vertebræ*. The operation was performed on February 15th on a boy 7½ years old, who, at the time, had no use whatever of his legs or control of his bladder. The soft parts were rapidly removed from the spinous processes, laminae, and inner portions of the transverse processes, and the spinous processes and laminae of the fourth, fifth, and sixth dorsal vertebræ were removed with bone-forceps. The spinal canal being opened, the dura mater was exposed, there being no granulation or cicatricial tissue obvious, nor was there any of the fat which normally exists in this position. The duramatal sheath, when first exposed, was flaccid, and the cord felt thin and soft; at first it did not pulsate, but after a time the pulsations, though slight, were obvious. The body of the fifth dorsal vertebra appeared to be abnormally near the laminae of the adjoining vertebræ, and it appeared that the cord had been forcibly compressed between these bony points. The wound was then closed, a small drainage-tube being fastened into the lower end of the wound, and a dressing of alembroth wool applied. The dressing was changed on the following day, when the drainage-tube was removed. The wound did not require another change of dressing. On the evening of the operation his temperature rose to 101.2° F. (38.5° C.) and his pulse was 130, but on the following morning the temperature was normal. To prevent the dressings being wetted his urine was drawn off at intervals during the day. Four days after the operation, he

was able to move his legs slightly in response to slight stimuli. The daily improvement in power in his legs was gradual, and he soon ceased to wet his bed. He lost his cough completely and gained flesh rapidly. On March 19th the child could move his legs freely, and Lane was only waiting till the cicatrix had sufficiently consolidated to apply a poroplastic jacket and to get him up.

Henry Thompson ^{Aug 17} reports a case of resection of the spinous processes and laminae of the last cervical and first two dorsal vertebrae for paralysis, caused by angular curvature from caries, resulting in recovery. Patrick M., aged 13, was admitted under the care of Thompson on January 28th, 1889. In 1883 part of a rickety wall fell on him, and, in consequence, he was an in-patient of the infirmary for three weeks with paraplegia. This paraplegia lasted for thirteen months and then completely disappeared, leaving, however, angular curvature in the lower cervical region. Three weeks before admission he began to complain of pain in his back, and paraplegia gradually developed. For a fortnight before admission he had complete loss of power in his legs, and they were often spasmodically drawn up. During night and day he was crying out with pain in his back and legs, and he had high temperature and night-sweats. On admission the boy was thin, with an anxious expression. There was an abrupt angular curvature about the junction of the cervical and dorsal vertebrae. The arms were partially paralyzed, more especially the muscles moving the shoulder-joints, and the intercostal muscles were paralyzed below the third or fourth interspace. Respiration was almost entirely diaphragmatic, the chest hyperæsthetic above the third rib, whilst the abdominal muscles were paralyzed and the legs completely so. Sensation in the paralyzed regions was delayed, but not absent. His deep reflexes were exaggerated, the superficial ones absent. He had power over the sphincters and over the bladder, but complained of much pain in urinating; urine highly alkaline. The temperature was 98.4° F. (36.80° C.). In spite of all treatment, he steadily went down hill, and by February 12th, owing to the development of great tympanites, which interfered with his diaphragmatic respiration, he was in imminent danger; and, after consultation with his colleagues, Thompson determined to try to relieve the pressure on the spinal cord, which was evidently the cause of his symptoms. On the evening of February 13th, chloro-

form having been administered, the region of the angle was thoroughly cleansed and made as aseptic as possible with solution of perchloride of mercury. Thompson, assisted by Pigeon, made an incision along the prominent angle, commencing an inch or so above its first appearance and terminating well below its disappearance. This incision was carried well down to the bone, and then, by means of a scalpel and periosteum elevator, the skin, muscles, and fasciæ were separated from the bones and the laminæ exposed. He then, with a fine saw and bone-forceps, divided the laminæ of two of the vertebræ and also separated the spinous processes of the same, and, after a little trouble, raised up the prominence and exposed the spinal membrane. The spines of the vertebræ first removed were supposed to be the last cervical and the first dorsal, and that of the second dorsal was afterward removed. The dura mater at first looked compressed and did not pulsate, but in a few minutes it commenced to do so. It was not thought necessary to open the sheath; so the wound was stitched up, covered over with protective, a thick layer of boracic-acid powder, and upon that a layer of alembroth wool was placed. A small drainage-tube was inserted before the wound was sutured. For some days he was very ill, although the tympanites almost immediately began to disappear; but after he had got over the shock of the operation he gradually but steadily improved. The wound was dressed three times, and was then completely healed. His recovery was delayed by a sharp attack of bronchitis, which came on March 14th, but he is now well in health; he can stand with one hand resting on a table; he can move his legs one before the other, can lift them up when laid on his back, and it is believed that he will completely recover. He has been regularly galvanized and shampooed, and will shortly be sent home. Thompson stated that resection of portions of the spinal column is, comparatively speaking, a new operation. When done for recent injuries it has been almost universally fatal. Macewen exhibited some cases in which he had removed portions of the column for various causes, but they were chronic in character, and he lays down the axiom not to interfere in the presence of any acute symptoms. A more extended experience will probably prove the advice of Macewen to be erroneous. The above case shows well some of the peculiarities of the paraplegia of Pott's disease, viz., loss of power without loss of sensation;

no paralysis of the bladder or rectum, but painful tenesmus of the former organ. I conclude that, during the process of the cure of the original curvature, the spinal cord had accommodated itself to its contracted *habitat*, but that the advent of a certain amount of fresh hyperæmia or inflammatory mischief was sufficient to produce pressure enough to redevelop the paraplegia. There is a very similar case recorded by W. A. Lane, of Guy's Hospital, ²_{Apr. 20}, but in his case the symptoms were neither so acute nor so marked, and much more rapid improvement followed.

The remarks of Figueira ¹⁵⁷_{Nov.} on trephining in Pott's disease are so appropriate that we quote them entire:—

“In the paper published by Richardson ¹⁵⁷_{July} on resection of the spinal column, and in the discussion following it, there are several points of interest to which I would like to call attention. The case reported by Richardson is as follows, viz.: A young man, 22 years old, was brought to the dispensary, and the diagnosis of Pott's disease of the neck was made, and tonic treatment and change of air advised. In August, three months afterward, paralysis of the extremities commenced, and in November he came to the dispensary again, and on the 11th day of December was operated on and died two days after. The first point to which I would like to call attention is the fact that, from the time the case came under treatment to the time of the operation and death, five months in all, no other means of treatment were used or advised besides medicines and fresh air. No mechanical means of any kind were used or advised for the support of the head and relief of the spine. Now, in the treatment of Pott's disease in the lower region of the spine, dorsal and lumbar, no one will deny the great success of treatment by plaster jackets and other mechanical means. Indeed, no surgeon will try to treat such diseases without the use of mechanical means. This, that is true of the lower spine, is equally so in regard to the cervical region. And as in this region the bodies of the vertebræ are smaller, the motions more free, and the ligaments looser, so the deformity from Pott's disease in this region comes on earlier, is more marked, and nature has less power to relieve it; and so the need for mechanical support is here more urgent than in other parts of the spine. In the plaster-of-Paris jacket, supplemented by the *jury-mast* with a proper support for the head, we have an admirable means of accomplishing this. It gives support

to the head, relieves the symptoms, and rectifies the deformity by means of the extension it is provided with, and at the same time gives the patient a chance for exercise and fresh air so necessary in this disease."

Robert H. M. Dawbarn,¹_{June 29} reported to the Section in Neurology of the New York Academy of Medicine, May 10th, the case of a man, aged 29, who had fallen 15 feet on the last day of August, 1888, striking his back—probably on a wagon—while in his descent; but of this they were not certain. He was unconscious for a time, and on waking was completely without sensation or power of motion below the ribs. He was delirious for fifteen days, and had considerable fever during this time. C. S. Collins, of Sing Sing, discovered fracture of spinous processes of eleventh and twelfth dorsal vertebræ, with considerable displacement. These he molded into position and applied a plaster-of-Paris splint, which was worn seven weeks, and another applied for two weeks longer, when he was able to be lifted into a chair without much pain. He was brought to the city and placed under Dawbarn's care December 20th. He then had complete paraplegia from just below the ribs. Involuntary passage of fæces; retention of urine, with overflow. Seguin saw him January 6, 1889, and advised galvanism daily, with massage and strychnine for six or eight weeks, and, if no improvement, then to cut down and remove the bone. No improvement followed the treatment, and L. C. Gray saw him on the 8th of February and urged an immediate explorative operation. This was performed by Dawbarn, on the 27th, by an **H**-incision, the vertical arms, 8 inches (0.20 metre) in length, from the seventh dorsal to the second lumbar vertebræ, slightly diverging as they descended; the transverse arm of the **H** between the twelfth dorsal and first lumbar spine. He then, with Hey's saw and rongeur, removed the laminae and spinous processes of the tenth, eleventh, and twelfth dorsal vertebræ.

The wound was closed with sutures of retention and of coaptation—both of catgut—and drained at the middle of the transverse arm of the **H**. An ample and smooth dressing of iodoform-and-bichloride gauze was applied; then thick layers of cotton-wadding about the body, and over all a stout plaster jacket from the armpits to the trochanters. The patient rallied well, and finally made an

excellent recovery,—able to ride and drive 20 to 25 miles (40 kilometres) without fatigue, and gradually recovering the use of his legs.

Dawbarn concludes his paper with this excellent advice: “Whenever, following traumatism, even a slight, abrupt irregularity of the spinal column is observed to co-exist with paraplegia from this bone, a cutting operation is indicated to determine whether the paralysis is not, by bony pressure, made incapable of spontaneous relief. The operation should be deferred no longer than recovery from the original shock of the injury demands. If needed at all, it is needed early: and we make a mistake if, as in my case, we wait until electricity and time have alike proved futile before attempting what I may call exploratory resection.” It will thus be seen that the advice of Dawbarn is directly at variance with that of Macewen. Time and more numerous observations will probably decide his views to be correct.

L. A. S.

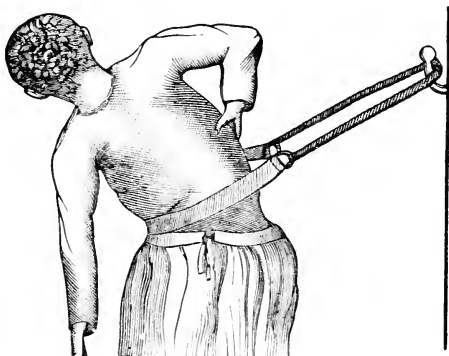
LATERAL CURVATURE.

Increasing attention is being paid year by year to the necessity of recognizing lateral curvature in its commencement, and to its correction by means of muscular exercises designed to straighten the curvature and educate the muscular sense of the patient to the point of holding the body in the best position possible.

In those cases which have been neglected until there is marked rotation and curving of the ribs, a number of methods have been suggested to supplement manual force in restoring the body to the normal position.

Richard Barwell, ⁶_{Apr. 27} describing rachylisis, a method of treating the severer forms of lateral curvature, says: “The case about to be considered (illustrated on pages 39 and 40) is one of rather severe lumbar curvature to the left, without or with only slight secondary dorsal curve,—a case in which shortening of muscles and ligaments is diagnosed. In order to stretch these, I use a girth of strong webbing, 3 inches (0.08 metre) wide and $2\frac{1}{2}$ feet (0.76 metre) long, each end of which is sewn round a strong flax cord of rather greater length, so that the whole forms a sling about $4\frac{1}{2}$ feet (1.37 metre) long when folded in two. The webbing part of this is placed on the left side of the patient’s loins (a pad protecting the soft parts may be improvised from a folded flannel petticoat or may be more

artistically made), and the cord is hitched upon a hook secured to the wall at about the height of this part of the figure. The patient must stand so that this girth is tight against her loin, but to obviate compression of the abdomen, a wooden strut, from 1 to 1½ feet (0.30 to 0.45 metre) long, is placed between the two ends of the webbing, which project on the patient's right. This and the pad are omitted in the figure. Thus arranged, the patient throws the upper part of her body sharply and powerfully to the left. She is to repeat this on each occasion several times, and the occasions are to recur twice, or even thrice, a day, according to power and health. These procedures suffice for the not very severe cases, and in more strongly marked ones, when the following more potent means are



BARWELL'S APPARATUS.
(*Lancet*.)

used, they should be additionally practiced. The more potent means are that the surgeon uses force to bend the patient's body. He may stand on her left, and, passing one arm behind the other in front of her, clasp his hands just under her right axilla and drag her, forcibly, even by considerable jerks, over to the left; or, he may let her sit on a chair, and, placing his knee on the right side of the seat to prevent the pelvis slipping, may, with his hand on the right side of the chest, force her over to the left. In still worse cases pulleys may be used somewhat after the manner now to be described for dorsal curve. When dealing with an S-shaped curve in its more advanced stages the arrangements are not quite so simple, and require some explanation. The figure shows a patient

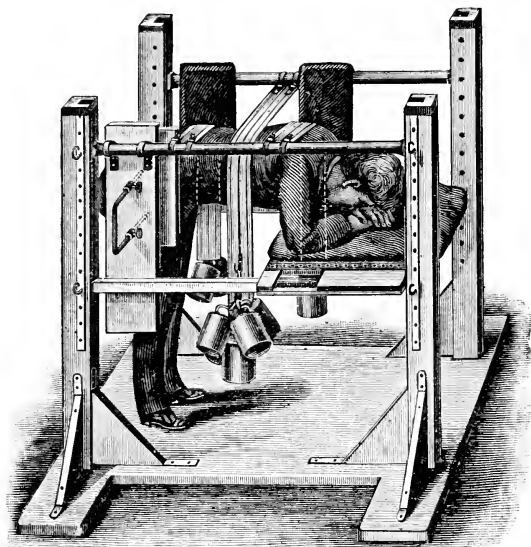
sitting, which is the most desirable posture. The loin-girth being arranged as before described, another similar loop is, for the present, allowed to hang loosely about her waist. She is then directed to bend over toward the left; a padded loop with webbing straps is passed over her left arm up to the axilla, and the cord attached thereto, which runs through a pulley, is drawn rather tight and secured on a blind-cord catch. The middle girth, till now hanging loose, is placed on her right side, opposite the most aberrant part of the dorsal spine, and into the rope part of the loop is hitched the hook of a system of pulleys such as is used for reducing dislocation after the Astley-Cooper method; the hook on the other



BARWELL'S APPARATUS.
(*Lancet.*)

set is caught in a cellar flap-ring screwed to the floor about 8 feet from the patient. The surgeon sees that the patient does not sit perfectly square between the hooks and the cellar flap-ring, but so turned that she faces a little (45 degrees) toward the latter. (In the figure, pads which guard the bandage from galling the patient are omitted for the sake of simplicity; nor is the turn of the body quite correctly given). He then takes the cord of the pulleys and draws on it gently, and, as soon as a little tension begins, he slips in between the ends of each girth, and close to the patient, a strut of wood 1 inch (0.025 metre) thick, from 10 to 18 inches (0.25 to 0.45 metre) long (according to her size), and 4 inches (0.10 metre)

broad; in each end is a hollow notch 3 inches (0.08 metre) wide, *i.e.*, long enough to secure the girth. These struts, by keeping the girths well asunder, prevent constriction of either abdomen or thorax, and in the latter case they obviate narrowing of the angles of the rib, which would otherwise result. With these struts and pads in position, the surgeon may now pull strongly on the cord, but the pull should not be continued beyond the first sensation of fatigue. I propose to call this process, since it loosens the shortened ligaments of the spine and muscles, ‘rachilysis.’”



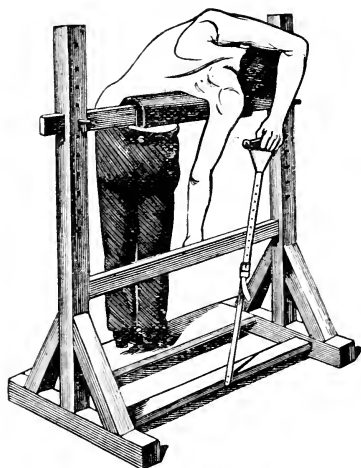
BEELY'S APPARATUS.

(*Centralblatt für Orthopädische Chirurgie und Mechanik.*)

Barwell's aim in trying to untwist the spine is undoubtedly correct, but it seems to me that it is hardly so correct an application of force as we obtain by using the apparatus described by F. Beely.⁷³⁸ This latter method is a modification of the device used by Fischer, and we should expect it to be of use, as we have found the same principle of service when using manual force instead of weights, the weights being preferable as they enable the treatment to be continued for a longer time.

Beely's apparatus can be better understood from the picture than from a description. (See figure on page 41.)

The patient stands with feet together, knees straight, and bends forward, making the back as nearly parallel with the floor as possible, resting the arms, bent at the elbows, on a cushioned support. Straps pass over the projecting ribs and hang down toward the floor, supporting weights of from 10 to 200 pounds (5 to 100 kilogrammes). Beginning with such a weight as the patient can comfortably endure for ten minutes, it is gradually increased until they can support from 100 to 200 pounds (50 to 100 kilo-



HOFFA'S CONTRIVANCE.
(Report of Holger Mygind.)

grammes). They rest for fifteen or twenty minutes after supporting the weight, and then repeat the exercise, say, three to five times, resting on an inclined plane during the interval. Beely does not agree with Fischer in discarding the plaster-of-Paris corset, but considers it useful in advanced cases to support the spine.

Albert Hoffa ³⁴_{July 2} contributes an excellent article, with photographs, showing most admirable results from the use of gymnastics and plaster-of-Paris corsets applied

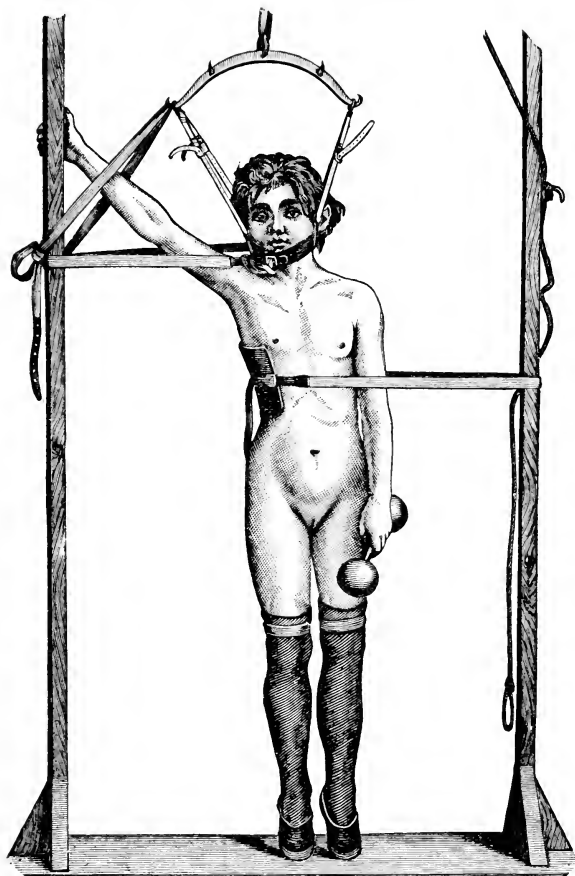
to the patient in the "untwisted" position, which he calls a "detorsion-corset." He uses also Beely's apparatus, and the sidewise stretching of Lorenz, as shown in the accompanying cut sent us by our corresponding editor in Stockholm, Sweden,—Holger Mygind.

The swing devised by Beely is also used by him with good results. It is the old-fashioned roller of the gymnasiums set on an axis so as to be easily rotated, and is excellent.

In one case of scoliosis high up he employed the suspension swing as shown in the cut on page 43, which method of suspension seems to us very sensible.

TORTICOLLIS.

Moriz Benedikt¹¹³_{Jah. 27} thinks that typical torticollis is not due to a central nervous lesion, but is a reflex neurosis, and, if seen



HOFFA'S SUSPENSION SWING.
(*Münchener Medicinische Wochenschrift.*)

soon after the onset of the trouble, and then treated with galvanism (alternating current), will recover without operative interference, which is almost always necessary in cases not so treated

until some time has elapsed. He reports 2 cures with galvanism together with local injections of 2-per-cent. carbolic-acid solution, 3 cases in which he stretched the spinal accessory with excellent results, and 1 case treated by galvanism and by injections of curare with marked benefit.

J. Crawford Renton²¹³_{May} reports a case of spasmodic wryneck, following exposure to cold which had not responded to medicinal treatment, in which he stretched the spinal accessory with the result of stopping the spasm of the sterno-mastoid for a fortnight, after which they recurred, but only to a slight degree.

J. E. Summers, Jr.,¹⁰⁶_{June} reports a case of section of the sterno-mastoid through an open wound parallel with the clavicle, without subsequent suture of the wound. The scar after the operation was somewhat large, but the function good.

Kirmisson and Ducurtil, as reported by P. Redard,⁵⁵_{Apr. 5} recommend the same incision, but sew up the skin wound with Florence silk.

Levrat,⁶_{Nov. 24, '88} makes the skin incision parallel to the sterno-mastoid, passes a director behind the latter and divides it. The head is restored at once to the normal position, and retained there by rubber bands passing from the mastoid on the sound side to the axilla of the same side, and fastened to silicate bandages going around the head and thorax, a firm, thick, antiseptic dressing having been first put over the wound.

R. W. Lovett,⁵⁹_{Oct. 19} reports a case of functional torticollis due, probably, to defective eye-sight, very much relieved by tenotomy of the internal rectus.

Charles B. Williams,⁹_{Nov. 16} reports a case of torticollis greatly improved by toxic doses of gelsemium after failure of myotomy. After failure to relieve the muscular spasm by section of the splenius capitis, electricity, and physiological doses of gelsemium, Weir Mitchell suggested hyperphysiological doses of this drug. Beginning with 3 drops of Wyeth's fluid extract three times a day, it was pushed to 24 drops four times a day, giving rise to dilatation of pupils, languor, some headache and flushing of face, slight attacks of giddiness, and a feeling as if a band were tied tightly around the forehead.

Treatment was continued for four months with great benefit. It was found that different preparations of gelsemium differed

very much in their strength. 12 drops of one being stronger than 30 drops of the same article prepared by a different firm.

SPINA BIFIDA.

According to the report of the London Committee on Spina Bifida (1885), the term "spina bifida" is used to define certain congenital malformations of the vertebral canal, with protrusion of some of its contents in the form of a fluid tumor. With very rare exceptions, the malformation affects the neural arches of the vertebræ and the tumor projects posteriorly. Three varieties are given: 1. Protrusion of membranes only (simple meningocele). 2. Protrusion of the membranes, together with the spinal cord and its appertaining nerves (meningo-myelocoele). 3. Protrusion of the membranes, together with the spinal cord, the central cavity of which is dilated so as to form the sac-cavity, the innermost lining being constituted by the expanded and atrophied substance of the cord (syringo-myelocoele). Meningo-myelocoele is the most frequent, while simple meningocele comes next and syringo-myelocoele comes last. Spina bifida is a rare condition, about 1 child in 1500 (some authorities put the figure as high as 3000) being born with this defect. The committee states that in the ordinary form of spina bifida (meningo-myelocoele) the spinal cord traverses the wall of the sac unchanged, giving off its nerves regularly as it lies in the sac-wall. They conclude that there is an absence in the walls of the tumor of the mesoblastic tissues, and accept Morgagni's theory that the deformity is due to lack of development of this embryonic tissue.

What may be the cause of this arrest of development, and what may be the pathological process under the influence of which it is produced, are not known.

It is doubtless hereditary, but may suddenly show itself in a particular generation without a previous known existence, as is related by Butler-Smythe,⁶ where 3 children of healthy stock were afflicted with spina bifida and hydrocephalus, all dying of convulsions before the seventh week.

The Special Committee of the Clinical Society¹¹²¹ reported in favor of the treatment by injection of iodo-glycerin solution, as recommended by J. Morton in 1877. The number of cases treated by this injection published in the report is 71, with the following

result: Recovered, 35; unrelieved, 5; relieved, 4; died, 27. The deaths are placed as follows: Meningitis, 7; shock, 5; marasmus, 7; hydrocephalus, 2; convulsions, 2; diarrhœa, 1; doubtful, 3. The other methods of treatment investigated were that by puncture or aspiration and subsequent pressure, 46, with 30 deaths; by ligature, 16, with 6 deaths; excision, 23, with 7 deaths; by injection of simple iodine solution, 26, with 5 deaths. Morton⁶_{v.1,p.1042,'85} gave an even more favorable account of the value of the treatment recommended by him, from his knowledge of cases in which it had been employed.

E. Stanmore Bishop⁶_{May 4} reports 2 cases in which he resorted to Morton's operation, one case being successful and the other, a very sickly child, dying in two days. In the successful case a rectal injection of bromide of potassium preceded the operation, to lessen the probability of convulsions following the withdrawal of fluid from the sac. Carver²_{May 11} also reports a case of spina bifida treated successfully by means of injection of Morton's fluid.

The use of injections for the cure of spina bifida was first suggested by Brainard, of Chicago, in 1848. His formula is:—

R Iodinii, gr. $\frac{1}{4}$ to v (0.016 to 0.32 gramme).
 Potassii iodidi, gr. $\frac{3}{4}$ to xv (0.05 to 0.97 gramme).
 Aq. destil., ʒj (31.00 grammes).
 M. Sig.: Use above ʒss (1.95 grammes) for each injection.

The rules for its use are: 1. Make the puncture subcutaneously in the sound skin by the side of the tumor. 2. Draw off no more serum than the quantity to be injected. 3. Apply pressure during the operation so that none of the solution shall enter the spinal canal. 4. If symptoms of irritation appear, draw off all the contents of the sac and replace them with distilled water. After the operation the patient should lie on his side, and, if there is much heat, evaporating lotions to the part are required. As soon as the tumor becomes flaccid it should be covered with collodion or supported by pressure. The injection should be repeated as often as necessary, care being taken that previous irritation has completely subsided.¹¹²²_{p.235}

James Morton's injection fluid has glycerin for its menstruum:—

R Iodinii, gr. x (0.65 gramme).
 Potassii iodidi, gr. xxx (1.95 grammes).
 Glycerinæ, f ʒj (31.00 grammes).—M.

It was thought that, as this fluid is less diffusible than either a spirituous or watery solution, it will be found less likely to permeate the cerebro-spinal fluid with rapidity, and so cause shock or bring on convulsions. According to the London Committee's tables, the injection of Morton's fluid showed a percentage of success higher than all other operative measures,—between 50 and 60 per cent.

Of the 7 cases treated by Brainard before the publication of his paper in 1861, in 3 only was there a permanent and complete recovery. Morton states, in one of his earlier reports, that of the 15 cases treated by his method 12 were successful and 3 fatal, and that all his own lumbar cases have hitherto been fortunate.

In successful cases treated by Morton's method the tumor soon shrivels up and becomes flat. In some of his cases only one injection was required.

The rules for the injection of Morton's fluid are similar to those given by Brainard. A small quantity of fluid is withdrawn, and about $\frac{1}{2}$ drachm (1.95 grammes) of the iodo-glycerin solution is injected. The puncture is sealed with collodion. Pressure is applied. When the sac refills the injection is repeated.

More recently, attention has been redirected to the excision of the sac as suggested by Mayo Robson⁶_{Apr. 4, '85} at a meeting of the London Clinical Society, where he reported 3 cases with 2 recoveries, having excised the sac "except two narrow portions, which were sufficient to form meningeal flaps, these being covered in by skin-flaps obtained by separation and sliding from the lumbar region." He also reported²_{Dec. 30, '82} a case where grafts from the periosteum of a living rabbit were placed between the meninges and the skin to cover the gap in the bones.

Carl Bayer⁸⁸_{No. 20} reviews the treatment of spina bifida recommended by other authors, and rejects the use of the seton, the injection of iodine, and the excision of a portion of the sac as being at the same time unsatisfactory and dangerous. He urges that the condition is one analogous to hernia, and should be treated in a somewhat similar manner; that the danger of meningitis in the one case is no greater than the danger of peritonitis in the other; and that, as compared with the operation above mentioned, it is both safer and more radical. In a child 10 days old, in which there was a large meningocele of the size of an apple,

and which had already developed bed-sores, he performed the following operation: The child was chloroformed, and the region of the bed-sores cleaned and rendered aseptic. Two lateral flaps were made from the skin covering the tumor and were dissected down to its pedicle. The child was turned on its belly in order to avoid excessive loss of cerebro-spinal fluid, and the sac of the meningocele was opened. The cauda equina was seen flattened out upon the posterior wall of the sac. It was loosened after dilatation of the incision, although in effecting this a slight laceration occurred on account of inflammatory adhesions. Two small arteries were ligated at the end of the cauda. No alteration of pupils and no spasm of the extremities were noticed. The cauda was replaced in the spinal canal and the sac of meningocele was removed, leaving only two lateral flaps of the dura, which were sewed together after thorough antiseptic cleansing of the wound. The muscles and skin were afterward brought together separately. The child recovered completely. Bayer suggests that possibly in the future, through a greater development of the technique of the operation, a bony roof over the sewed sac may be produced by forming two lateral periosteal flaps from the canal of the sacrum.

Vladimir N. Zenenko, of St. Petersburg,¹⁰⁰⁸
Nos. 2, 8 communicates a case of sacral meningo-myelocele in a boy, aged 15 years, where he made complete extirpation of the tumor, with the transplantation of bone for filling up the osseous defect. From the patient's early childhood the hernial sac had been bursting from time to time, to discharge large amounts of the cerebro-spinal fluid—about 300 cubic centimetres (10.14 minims) in a few hours—and to gradually fill up again. On examination, the boy was found to be exceedingly emaciated, and to suffer from incontinence of the urine and fæces; he was unable to walk or stand on account of extreme wasting of the muscles of his lower limbs and flexor contractures in the knee-joints. The tumor measured 32 centimetres (12.6 inches) in diameter and 9 centimetres (3.54 inches) in height, and contained thick loops of the cauda equina; it protruded through a defect measuring $3\frac{1}{2}$ centimetres (1.38 inches) in breadth in its upper part and somewhat narrowing downward, the gap arising through the separation of the arches of the first and second dorsal vertebræ. The patient's condition being utterly helpless and hopeless, the operation was undertaken without delay.

Having extirpated the tumor, including the central portion of the integuments and the said loops of the cauda, the author carried two longitudinal incisions along both sides of the defect down to the bone, and then split off, by means of a gouge, two osseous bridges consisting of the rudiments of the arches and posterior tubercles of the sacrum, and measuring each about 2 centimetres (0.79 inch) in breadth. The aponeurosis having been dissected, the bridges could be easily brought in direct contact, and the parts closed with sutures (three *étage* ones). Except a small central area, the wound healed *per primam*. Four months later the boy was up and about in excellent state. His general health strikingly improved; the contractures and muscular atrophy disappeared; his micturition and defecation became normal; he was able to walk, and even to run about, without any fatigue. The posterior aspect of the sacrum represented a fairly smooth, equally hard surface, showing no tenderness on pressure. He remained in this condition ever since the operation (a year had elapsed). Discussing his very instructive case and reviewing the subject in general, Zenenko lays stress especially on the following points of importance:—

1. The mortality from spina bifida is truly enormous. Thus, of 32 cases of the defect which have been observed in the St. Petersburg Foundlings' Home during 1871 to 1887, as many as 30 ended in death in the course of a few first months of life and only 2 survived a year. R. Demme states that of 57 cases admitted to Zenner's Hospital in Berne, 32 remained without treatment; every one of them died, having survived but a few months.
2. In view of such a terrible mortality, surgical treatment is imperatively indicated in all cases coming under observation, which postulate holds true not only in regard to meningocele, but also in regard to meningo-myelocoele, more especially when the latter is situated about the lower part of the sacrum.
3. The most rational plan is constituted by a complete extirpation of the sac, with some plastic procedure for covering the defect.
4. In the presence of osseous defect, an osteoplastic operation is fully justified, which should consist in the transplantation of osseous bridges derived from rudimentary vertebral laminae or from lateral areas of the posterior surface of the sacrum.
5. The removal of the nerve-branches present in the hernial sac apparently does not cause any

discernible disturbances in the functions of any organs. At all events, no derangements of the kind are observed after the removal of the tumor of long standing situated in the sacral region. 6. A complete restoration of the vertebral canals as secured by the osteoplastic operation seems to remove all functional disturbances dependent upon the defect under consideration. 7. Of all other methods of treatment of spina bifida, the puncture is most unreliable as well as most dangerous, since it is apt to cause purulent inflammation of the meninges, with lethal issue; while Mayo Robson's plan (complete extirpation with closing the defect with soft parts) is most rational. It proved successful also in Zenenko's hands in a case of an adult man with occult sacral meningo-myelocele.

De Forrest Willard¹¹²_{May} reports a case of spina bifida in which he removed the sac and sewed up the membranes, and then the skin, with continuous catgut sutures. The case did well for five days. On the sixth day the child became more restless, the temperature rose to 103° F. (39.46° C.), and death occurred quietly in a few hours without special assignable cause and without convulsions. The flaps had united firmly save at one minute point, and the wound was perfectly healthy. Post-mortem not permitted. He says: "Although the case terminated fatally, I should not hesitate to again resort to it, as the 'expectant' plan, injection with iodized glycerin, constriction of neck of sac, ligation, etc., have all proved equally unavailing in my hands."

E. P. Hurd⁸⁰_{Oct} reports a case of lumbo-sacral meningo-myelocele successfully treated by excision of the sac and closure of the parts by layers of buried sutures, after Marcy's manner of treating hernia. A. E. Hoadley reported a successful case to the Chicago Medical Society, and Charles T. Parkes reported 3 cases to the Chicago Gynæcological Society, 2 of which were successful.⁶¹_{Nov. 2}

It seems pretty well shown by the testimony of these last operators (1) that the escape of a considerable quantity of fluid from the sac is not necessarily attended by dangerous sequelæ; (2) that there is less danger from injury to the nerve-structures than has been believed, and (3) that many of the unfavorable results of former operations were, doubtless, due to lack of proper precautions relative to the prevention of sepsis.

These conclusions are not accepted by Jacques Bondieu,³⁷⁰_{Sept}

who reports a case of lumbo-sacral meningocele treated by extirpation of the sac and closure of membranes and skin by quilted-silk sutures. The result was a partial cure, but the child died of measles a month afterward. He says that ligation of the sac or its total extirpation are to be wholly condemned in cases of myelomeningocele, though applicable to meningocele, and the same he thinks true of osteoplastic measures.

CLUB-FOOT.

There is but little difference among authorities as to the importance of commencing the treatment of congenital club-foot as soon as possible after birth, and hardly a question that cases thus treated should have a practically normal foot by the time the child is of age to walk.

In regard to those cases which have been untreated, or improperly treated, and which have walked for a number of years with the feet more or less distorted, there remains a marked difference of opinion as to treatment.

Certain cases of equino-varus, which did not give favorable results after tenotomy, caused Little long ago to suggest the removal of the cuboid, which advice was followed out by Solly in 1854. In 1866 Otto Weber tried cuneiform tarsotomy, removing from the outside of the foot a wedge of bone composed of the cuboid part of the os calcis and part of the cuneiform. The patient, unfortunately, died from hospital gangrene. Thorens mentions this case in his thesis. In 1874 Davies Colley performed the same operation, with antiseptic precautions, successfully. Thinking the astragalus was at the bottom of the mischief, Lund suggested its extirpation, which operation he performed successfully in 1872.

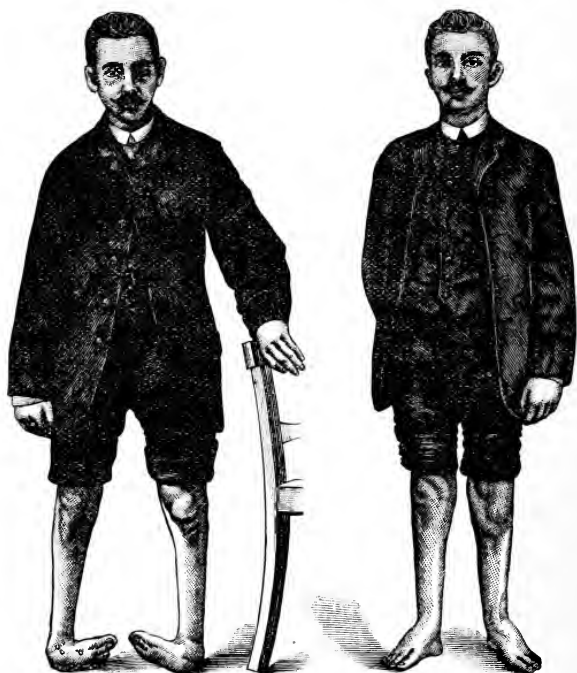
These various bone operations are based on the hypothesis that, owing partly to the congenital malformation of the bones of the tarsus, and partly to the abnormal shape they have acquired from long-continued pressure in an abnormal direction, the normal position cannot be secured for the foot (in equino-varus, for example) except by removal of the superfluous mass of bone; yet, in a case of hysterical club-foot of only ten weeks' standing, occurring in a girl 12 years old, which was shown to the orthopædic section of the New York Academy of Medicine by N. M. Shaffer,¹ Aug. 31, the deformity was precisely similar to that seen in un-

treated equino-varus of long standing, as we remarked at the time, although the foot could be placed in the normal position with a slight degree of force, as there was as yet no contraction or hardening of the ligaments, and the foot was merely held distorted by anomalous muscular action and not by bone-changes. Had the ligaments been so shortened as to have resisted reduction of the deformity, the advocates of tarsectomy would have pointed to it as a case for this operation, holding that the faulty position was due to distorted bones. At the March meeting of the London Pathological Society, D'Arcy Power⁶_{MAR.23} presented several specimens of dissected club-feet, and the remarks of R. W. Parker at this time on the part played by the obliquity of the astragalus (of which so much has been said) are interesting as bearing on this point. In discussing the cause of this condition he said that the obliquity of the astragalus was not the essential feature, for not only had they found a foot with typical deformity and a quite normal astragalus, but the condition of the astragalus of the adult ape was like that usually seen in feet with talipes, yet the ape did not present talipes. The deformity was due to purely mechanical causes; equino-varus was the natural position of rest in chloroform narcosis and in deep sleep. The changes in the bones and ligaments made speedy cure impossible.

In this question of varus we have a choice in our methods of unfolding the foot into its normal position. We must either remove a wedge from the outer side, and thus shorten it, or we must lengthen the inner side of the foot. The examinations of various club-feet, both alive and on the cadaver, show that, although there often, and indeed usually, are changes in the shapes of the articulating faces of the bones, yet the chief obstacles to replacement are the dense ligaments of the tarsus, especially the internal lateral and the astragalo-scaphoid, and the various prolongations of the plantar aponeurosis. When these are freely divided, the foot in almost all instances—we are rather tempted to say all instances—yields to nearly the normal position. If a foot can be freed from deformity without the removal of a wedge of bone or the extirpation of a part or the whole of the astragalus, the patient has a much surer and more elastic support than when these bone operations are resorted to, as they almost invariably leave more or less ankylosis and diminution in size of the foot, and are not always followed by cure.

Parker's remark that "the changes in bone and ligaments made speedy cure impossible" is undoubtedly so, and whatever method may be adopted to bring the feet into normal position must be supplemented by means to keep them in this position until the ligaments and the articular faces of the bones have so adjusted themselves that this normal relation can be retained voluntarily for any length of time. As for the method of reducing the foot to the normal position, various proceedings are advocated. Gibney²⁰⁷ Feb. gives a series of cases treated by the wrench of Thomas, of Liverpool, which is a modified monkey-wrench, with rubber-covered jaws, which seize the foot over the astragalus at one point and in the plantar arch as the other point of pressure. The arms are tightened and the foot thus securely held, while by the handle the foot is wrenched into position under an anæsthetic,—a proceeding which, in his 12 cases, was followed by sloughing in but one instance. After the foot has been wrenched into position it is retained there by a plaster-of-Paris bandage. One of the most interesting articles of the year is by Julius Wolff,⁴ in which he claims perfect success in the treatment of the most inveterate cases of club-foot, in patients between 24 and 32 years old, by means of portable silicate bandages, having resorted to no other operative proceedings than subcutaneous division of tendons and fascia. His theory is that in the "alterative force" ("transformationskraft")—a force arising from alterations of the static relations of the foot, and changing the form and internal architecture of the foot accordingly—we have to do with a force of incalculable amount. In other words, this force can overcome all internal resistance; even the degree of consolidation and the age of the patient do not come into consideration. The results, as shown in the illustrations, two of which are reproduced (next page), are most admirable, and it is to be regretted that the author's explanation of the mode of treatment is not equally lucid,—at any rate, to us. It is presumed that, after subcutaneous tenotomy and division of all constricting bands of fascia, the foot is replaced by manual force in as good a position as possible, and retained there by a well-fitting silicate bandage; though the author does not mention whether he uses manual or instrumental force to twist the foot, or how far he aims to correct it at one sitting. From the fact that the patient shown in the illustrations now reproduced wore but two bandages

during the course of treatment, each for six months without change, it is to be inferred that the feet were wrenched into pretty good shape at the time of the first operation, and that the “transformations-kraft” is the corrective influence that the weight of the body always has on distorted feet, if allowed to fall on them at a proper angle, just as it has a most pernicious result when it is im-



WOLFF'S CASE OF CLUB-FOOT.
(*Berliner Klinische Wochenschrift.*)

properly applied. The case illustrated had been two years without treatment or apparatus when shown at the Berlin Society.

Another strong advocate of the efficacy of time and properly-applied force to mold the distorted feet into correct shape is N. M. Shaffer,⁵⁹ who describes some of the deformities of the tarsus in congenital equino-varus, with a description of the new lateral traction apparatus. He believes: 1. That there is a compound

deformity in equino-varus due to rotation of the bones of the tarsus upon three distinct axes, viz., transverse, antero-posterior, and vertical. 2. That this compound deformity is due to a loss of relation between muscular and osseous growth,—not to muscular contraction or contracture, as has generally been supposed. 3. That the principal obstacles to a reduction of the deformity are (1) the position acquired by the astragalus (with or without an intrinsic deformity of the neck) and (2) the ligamentous shortening. 4. That these difficulties are much increased by the progressive ligamentous and osseous changes that occur as the direct result of prolonged malposition. 5. That the deformities of the medio-tarsal joint are secondary in importance to those which occur at the astragalus.

Our first effort, therefore, should be to attack the gastrocnemius-shortening in such a way as to overcome its secondary effects; and it must be evident that any method which neglects the gastrocnemius-shortening must fail. But the entire tarsus is rotated, and we must not make the error of using the cuboid as a point of resistance to overcome the rotation of the tarsus, for the simple reason that if we do so we at once block the mechanism, whatever it may be, designed to overcome the rotation of the tarsus. The cuboid has taken its acquired position on account of its close relation with the os calcis. The tarsus, as a whole, should be thrown *downward and outward* (reversing the curve of the deformity, which is *inward and upward*), on an antero-posterior axis to *outward* upon the same axis, and this downward-and-outward rotating force should be applied upon a remote axis until the os calcis and the astragalus fall directly under the tibia, the mechanism being so arranged that the rotation upon a transverse axis is also attacked. We must also remember, in treating all these cases,—even those seen immediately after birth,—that we are not dealing with muscular shortening only. Two other potent factors must be considered, and these are (1) the resistance which exists at the shortened ligamentous structure, and (2) a possible or even probable intrinsic deformity of the neck of the astragalus. And it must be remembered that these ligamentous structures soon adapt themselves to the acquired position of the bones of the tarsus. It is surprising how soon these ligaments shorten, and this remark is especially true of the internal lateral ligament of the ankle-joint. Any procedure which ignores this condition or the changed articular surfaces is apt

to result in failure. And the difficulty of attacking these shortened ligamentous tissues, especially those upon the internal malleolar aspect of the ankle, is apparent. The aim of this new traction apparatus is to bring the rotated tarsus, as a whole, and by a very simple movement, directly under the inferior articulating surface of the tibia, attacking not only the post-tibial resistance, but also and especially, the stubborn shortening of the internal lateral ligament, as well as all the other contracted tissues upon the inner or concave side of the deformity. If the neck of the astragalus is twisted, a very great force is applied to it in the right direction.

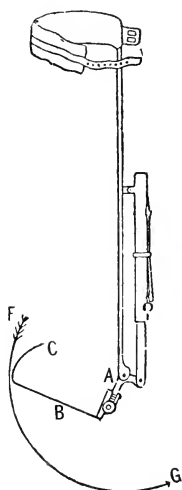


FIG. 1.

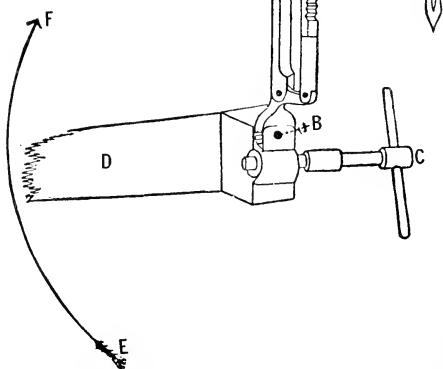


FIG. 2.

SHAFFER'S APPARATUS.
(*Medical Record.*)

In Fig. 1 there is shown a schematic engraving of the external lateral-traction apparatus, illustrating its application to a condition of equino-varus of the left foot and its movement upon a remote antero-posterior axis. The centre of motion is at the point A, remote from the tarsus and outside of, but directly over, the external malleolus. The anterior portion of the foot rests upon the foot-piece (B), inside the curved lateral plate (C), which grasps the inner

aspect of the foot at the junction of the first metatarsal bone with the first phalanx of the great toe. The heel is retained by the conventional astragalar retention-strap and the heel traction-strap of the antero-posterior traction apparatus. The foot-plate of the apparatus is removed posterior to the point which corresponds with the junction of the tarsus and metatarsus, leaving an open and unobstructed space for the descent of the heel when traction is applied. The necessary arrangements to secure the heel, etc. (not shown in this engraving) are the same as those used in the application of the antero-posterior traction-shoe, which has been described in full.¹

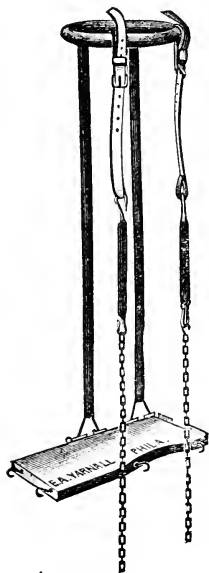
Mar. 5, 12, '87

The foot being secured by the straps referred to, in the apparatus under consideration, in its deformed position (at the angle, for example, shown in Fig. 1), a key (A, Fig. 2) is introduced at the cylinder (D), and the extension-rod (E) is *shortened*. The entire foot-piece of the apparatus is thrown downward and outward by this movement in the direction of the curved arrow (F), upon the remote centre (A), and the foot, properly secured in the apparatus, follows the same movement.

Fig. 2 gives a side-view of the apparatus and illustrates the action of the apparatus upon a transverse axis. The centre of motion on a transverse axis is at the point B, the key (C) acting on a worm and screw which lowers or elevates the anterior part of the apparatus (D). The foot being retained in the apparatus by the astragalar and heel retention-straps already referred to, and secured in the exact position of the deformity, the initial force is applied by turning the key (C) so as to move the anterior part of the apparatus (D) in the direction indicated by the curved arrow (E-F, Fig. 2), until a considerable resistance is offered by the shortened tissues of the foot. Then the key (A) is used; the outside retraction bar and rod is forcibly shortened, and the whole foot rotates downward and outward, as indicated by the curved arrow (F-G, Fig. 1).

O. von Büngner³³⁶
June 15 reviews the treatment of club-foot as practiced in Volkmann's clinic since 1880. For severe cases of club-foot which do not yield to manual traction and orthopædic treatment with tenotomy of the tendo Achillis, between 1880 and 1882 cuneiform osteotomy was employed, from 1884 to 1888 removal of the astragalus according to Lund was tried, and from

1884 to 1889 Phelps's open incision on the inner side of the foot was adopted. Having tried these various methods in a number of cases, he expresses himself as preferring the Phelps operation to either of the others, and says the two former have now been abandoned as not producing good permanent results. Kirmisson³_{Oct. 16} also bears testimony to the favorable results secured by Phelps's operation, which he thinks will supplant the more formidable operations on the tarsus.



HOLT'S SPLINT.
(*British Medical Journal*.)

R. L. Holt,²_{May 18} describes a splint for use after tarsotomy. (See figure.) This consists of a circular ring of iron, well padded; fixed to it are two parallel bars at right angles to the plane of the circle. To the distal ends of these bars is attached a foot-piece which moves on hinges, and on the outer side of the foot-piece are two hooks. After the operation for varus and the application of the dressings, the ring of the splint is passed up the leg and the foot is securely bandaged to the foot-piece at whatever angle it may be, for after the operation the foot still retains its deformity, partly on account of ligamentous attachments. Then the outer side of the ring and the outer side of the foot-piece are connected by means of a rubber band ending in a chain to be hooked on to the foot-piece, so as to have the tension required to bring the foot into shape. This may be altered according to circumstances. In order to make the splint

more useful, the hinges are made with movable pins, and at the heel end of the foot-piece are the necessary portions of the hinge to fit on to the ends of the bars. Then it may be used for talipes equinus, there being hooks fitted on to the toe part of the foot-piece.

Bernard Roth,⁶_{Oct. 26} describes a new elevating spring (see figure) for foot-drop due to paralysis of the anterior tibial muscles, whether occurring in infantile paralysis or in the paralysis of adults. It consists of a curved rod (B. C) of well-tempered steel, molded to the

posterior outline of the leg below the knee, and more convex posteriorly than indicated in the figure. The upper end (B) of the spring fits a socket in an ordinary transverse leather band (A), buckled round the calf, while the lower end (C) fits a hole in the back of the heel of the boot, where it may either be a permanent fixture or made to extend to a spring-catch (D) in front of the heel. A steel plate is embedded in the sole to prevent the latter yielding to the weight of the foot. The spring should form, when not being worn, a more acute angle with the sole of the boot than is shown in the illustration, and its strength should be sufficient to keep the patient's foot at a right angle or less with the leg while walking. The following are the advantages claimed for this splint: 1. First and foremost, its simplicity and durability as compared with the constant renewing of elastic tractors, and the frequent breakage of complicated steel springs for foot-drop. 2. Its sightliness; from the spring being placed behind the leg, it is scarcely noticed when worn. 3. Its comfort to the patient in being very light and in not catching the dress, as is the case with other foot-drop splints, where the spring is attached to one side of the leg. 4. Lastly, and not its least advantage, its cheapness.



ROTH'S ELEVATING SPRING.
(*Lancet*.)

FLAT-FOOT.

Trendelenburg¹¹³_{June 23} and Hahn⁶⁹_{Apr. 26} having had, in cases of flat-foot resulting from badly united Pott's fracture, good results from osteotomy of tibia and fibula just above the malleoli, have each tried the same procedure in cases of idiopathic flat-foot, and claim most excellent results. Trendelenburg holds that as the weight of the body is thus transferred to the foot, so that a line through the long axis of the tibia falls within the foot, and not toward the mesial line of the body, the distorted bones of the foot resume their normal relations. In discussing the question, Julius Wolff held that remodeling the foot itself by silicate bandages, continued for months, gave better results than osteotomy. It is certainly more reasonable to attack the deformity *in situ* rather than to change the relations above the ankle-joint.

At a meeting of the Medical Society of London, held March 25th, Richard Davy and Golding-Bird both read papers on operations on the tarsus for the relief of confirmed flat-foot. Davy⁶_{Apr.6} objected to the removal of the astragalo-scapoid joint and pegging of the bones together, as "too complicated, inconvenient, attended with some danger, and that intrusion upon the astragalus brought the surgeon into rather too close relation with the ankle-joint, the integrity of which joint is a matter of much importance in flat-foot," and suggested that the simple removal of the scaphoid was an operation of comparative ease, and restored the arch of the foot equally well. He exhibited 2 patients on whom he had operated by removing the scaphoid, with the result of freeing them from pain, but not of removing the deformity. The priority of all these various operations on the tarsus for relief of flat-foot belongs to Golding-Bird, who operated in 1878, as stated by Thomas Bryant, in the discussion on Ogston's paper on this subject, on January 14, 1884. In his last paper Golding-Bird⁶_{Apr.6} says: "To justify such an operation as osteotomy, or removal of bone from the tarsus in flat-foot, the mere fact that there is an architectural failure in the fallen arch, and so some deformity, is not, in my opinion, sufficient. A patient with flat-foot applies for relief not for objective symptoms, but for the subjective one of pain, and this relief can almost always be given by means other than operative. Along with these objective symptoms there is a most wearying and constant aching under the external malleolus, whether accompanied or not by other pains about the ankle. The pain is always present on standing, and after a few hours it becomes a physical impossibility to stand any longer. Now, an external malleolar pain is common to all flat-foot cases, and is most marked where eversion is best declared, and it is due to the crowding of the tissues against the outer malleolus from the malposition of the tarsus. If the foot is returned again to the normal line of the leg, the patient stands without pain; but in these worst cases that I am referring to the extreme pain is not thus easily relieved. A deep-seated aching still incapacitates the patient, whatever the position of his foot; it is due, I believe, to a special cause. It depends upon the fact that, since the arch of the foot is sunken and its piers are now wider apart on the inner side of the foot, a corresponding crowding or mutual pressure of the bony structures

forming the outer or supporting edge of the sole takes place, which mere reposition of the foot will not improve.

“It is in these cases, if any, in which tarsotomy in some form is called for; and it is in 4 such, in the years 1878 to 1880, that I operated. All were between 12 and 17 years of age, and had histories varying from two to five years. In 2 the scaphoid alone was removed, and in 2 that bone and the head of the astragalus, the idea being to remove the wedge on the inner side, which caused the pain on the outer. In all, the steps of the operation were the same and the results uniformly good, 3 of the patients being up within the month. All were cured of pain, but in one only was the arch really restored. It was in one in which, besides removing the scaphoid, I sawed subcutaneously across the whole tarsus; by this means it was easy, on a suitable splint, to adduct and rotate the front upon the back part of the foot; and, though the same splint was employed in all the cases, yet in 3 of them, because of the integrity of the outer border of the tarsus, apposition of the cuneiform and astragalus on the inner side could not be maintained. By ablation of bone, together with a true tarsotomy, the restoration of the arch, if desired, can be assured, and the use of pegs to unite the sides of the wound in the tarsus will be quite uncalled for. These 4 cases on which I operated came before me in the course of 50 consecutive cases of flat-foot, which would give a percentage of 8 for operation. But in the last eight years I have not seen a case demanding operation, and in which I could not cure by non-operative means; so, either my percentage reads too high, or, what is nearer the mark, I think that I have been able to adapt, in an increasingly effectual and practicable manner, to all sorts and conditions of patients, the principle of the elastic-spring dressing introduced years ago by Barwell.”

HALLUX VALGUS.

George R. Fowler ⁵⁹_{Sept. 7} suggests in hallux valgus the partial resection of the head of the first metatarsal bone as follows:—

An incision is made from a point upon the dorsum of the foot, somewhat below the level of the head of the first metatarsal bone, and just outside of that portion of the tendon of the extensor brevis digitorum which goes to the great toe; this is continued to the bottom of the web between the first and great toes. A similar

incision is made on the plantar surface of the foot, slightly to the outer side of the line of the tendon of the flexor longus pollicis. The intervening parts are divided through the whole thickness of the sole of the foot, so as to join these two incisions. The great toe is then strongly adducted and the external lateral ligament divided, opening the joint. After freeing the soft parts from the neck of the first metatarsal bone with the handle of the scalpel, the phalanx is completely displaced. The great toe is adducted still further, until its inner border lies along the inner border of the foot, its point looking directly backward; the head and neck of the first metatarsal bone, together with a large exostosis constituting the "bunion," are thus freely exposed. The latter, together with the inner half of the articular surface of the former, are to be sawn off

by an oblique cut, as shown by the dotted line (Fig. 2). The toe is then



FIG. 1.



FIG. 2.



FIG. 3.

(Medical Record.)

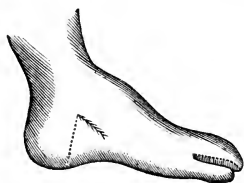


FIG. 4.

to be replaced in its normal position (see Fig. 3), and drainage provided for by a tube in the bottom of the gap. The soft parts are sutured; dressings of sublimate gauze and paper-wool and a splint are applied to retain the toe in a straight position.

In after-treatment he advocates the same plan that was recommended by R. T. Morris.

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In the first place, a stocking of rather more than ordinary width is chosen, and a double line of stitching run at the site of the interspace of the great and adjoining toes; by cutting accurately between the lines of stitching, a separate cot or receptacle is provided for the great toe, similar to the thumb portion of a mitten. Fig. 4 shows the stocking so arranged, drawn upon the foot. A shoe is then made, with a separate compartment located upon its inner border, and corresponding to the point at which the great

toe should rest. In selecting a last for this shoe, care should be exercised in order to secure the so-called "common-sense" shape, *i.e.*, that which presents a straight inner edge of the foot. The partition separating the compartment for the great toe from the balance of the front of the shoe is made of two thicknesses of calf-skin, and is secured in place in the following manner: The last is split, as shown in Fig. 5, and the pieces of calf-skin from which the partition is to be formed are placed in position in the slot, a sufficient projection being left to pass through a slit in what is to be the inside sole of the shoe, in which latter location it is secured while still upon the last. The shoe and welt are then lasted in the ordinary manner, the reflected upper edges of the partition being stitched to the toe portion of the upper, and the shoe being arranged, in order to facilitate putting it on properly, to lace as low down as the site of the partition, which latter may be only just



FIG. 5.

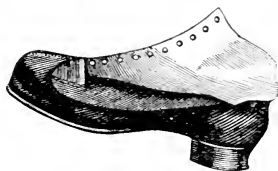


FIG. 6.

(*Medical Record.*)

sufficiently deep to get a firm hold upon the toe, say about one-third the depth of the interdigital space. Fig. 6 shows the shoe with one side of the upper cut away in order to show the partition.

Morris¹⁰¹_{sen.} has now discarded the partition in the shoe, and uses instead a thin copper insole, with a flange turned up to hold the toe in place.

The advantages of this method of operating are: 1. Facility of reaching the articulation and determining the exact pathological changes present, and thereby determining the necessity or otherwise of removing the entire or only a portion of the articular extremity of the metatarsal bone. 2. The incision is made through healthy structures, thereby barring some error in the aseptic technique, insuring an uninterrupted and rapid course of healing. 3. The external lateral ligament is divided, thus eliminating this as a possible hindrance to the reduction of the deformity. 4. It renders practicable Reverdin's proposal to remove the exostosis when it

exists, this latter being the best operation for the purpose of effecting a cure of hallux valgus. Plastic exudation or an organized blood-clot at once fills up the space made by the removal of the exostosis; this is not interfered with in its reparative progress by possible infection through a wound from without, and adapts itself to the new location at once. 5. If contracture of the extensor hallucis exists to an extent sufficient to prevent easy reduction, section of this tendon may be done through the same opening. 6. It does not interfere with the attachments of the abductor pollicis, thereby favoring relapse from this cause. 7. The resultant cicatrix is so situated as to be out of harm's way when the patient resumes the use of shoes. Hüter's operation, as well as that of section of the shaft of the metatarsal bone to facilitate reduction, may also be performed through the same wound.

MAIN EN CROCHET.

E. Rollet⁹¹ describes a deformity of the hand peculiar to glass-blowers, and formed only among those who blow large pieces of glass, which proceeding requires the use of long iron tubes weighing, with the glass at the end, from 2 to 14 kilogrammes (4 to 28 pounds). These tubes are so hot as to burn the hands of those unaccustomed to their use, and are kept rolling constantly by the fingers, which are thus kept almost continually in a state of flexion for hours at a time. This exposure to heat and moisture while the fingers are constantly flexed causes a deformity called, by Poncet, *main en crochet*, or, by the glass-blowers, *main fermée*, which is characterized by permanent contraction of the fingers due to flexion of the second upon the first phalanx. This is first manifested in the left hand, as this holds the hotter part of the iron tube. The little finger is affected first, then the ring-finger, and next the middle finger. The skin gradually becomes callous and cracked, the interosseous muscles atrophy slightly, and the hand assumes the characteristic position whence Rollet has devised the name *main en crochet*. Taken in its early stages, good results are obtained from the use of massage, friction, inunction, and electricity, accompanied by a change of work. In the later stages the flexion of the second phalanx upon the first is too strong to be entirely overcome.

R. H. S.

AMPUTATIONS, EXCISIONS, AND PLASTIC SURGERY; DISEASES OF BONES AND JOINTS.

By P. S. CONNER, M.D., LL.D.,

CINCINNATI.

AMPUTATIONS.

Poland⁴²⁸ reviews the amputation record of Guy's Hospital with special reference to the occurrence of secondary hæmorrhage. Comparing the two periods, 1860 to 1874 and 1875 to 1886, he finds that of 559 amputations in the first and 782 in the second period the mortality rates were 35.4 and 23.6 per cent. The deaths from secondary hæmorrhage in the years 1877 to 1886, inclusive, were 6, and the number of non-fatal bleedings 10,—a total of 2.6 per cent. (16 to 641). After 168 primary amputations there were 3 slight bleedings; after 77 secondary amputations, 2 slight, 1 fatal; after 334 pathological amputations, 10 slight, 4 fatal; after 62 expediency amputations, 1 fatal.

The femoral artery was the one most commonly affected. The method employed in occluding the vessel seemed to make no material difference, provided that a septic ligature was not used; and calcareous arteries did not predispose, nor visceral disease, to the extent generally supposed.

In a case reported by White¹¹²_{Aug.} a consecutive hæmorrhage was arrested by the use of an iodoform tampon.

Of 42 major amputations at the Newcastle Royal Infirmary, in 1888, (Page⁶_{July 13}) 6 (14.2 per cent.) terminated fatally, no deaths occurring in the 29 operations for disease, but 6 out of the 13 for injury, 4 of septic infection, 1 each of tetanus and shock.

Adler,⁵_{Sept.} upon examination of the statistics of amputations done at Guy's and St. Bartholomew's Hospitals, finds that "previous to the adoption of aseptic or Listerian treatment of wounds a mortality of 31.9 per cent. was recorded. Subsequent to that time, under aseptic precautions, the death-rate has been decreased to 12.5 per cent.,—a saving of life of nearly 20 per cent."

Multiple Amputations.—Successful *double* amputations are reported by Ferguson,⁷⁵⁶_{Nov.} both legs; Frick,⁷⁶⁰_{Sept.7} both legs; Messenger,¹⁰¹_{Jan.} both legs; Keen,⁷⁶⁰_{May 11} both arms; and Stephens,⁷⁶⁰_{Oct.12} both feet in middle; *triple*, by Allen,⁶_{Apr.12} left elbow, left ankle, and right leg; Alexander,⁸⁰¹_{May} right arm, right thigh, and left leg; Banker,²²⁴_{Mar.2} both legs and right wrist; Heath,⁹⁰_{June} left leg, right ankle, and left forearm; Hubert,²⁷⁶_{May 5} right thigh, left leg, right forearm; and a fatal triple amputation—right arm, right leg, and left thigh—by Williams.⁵⁰_{Sept.21}

Maddin,⁵⁹_{Apr.27} operated successfully through the thigh for gangrene upon a child 3 days old, and McBurney above the knee in a case of Charcot's disease. A patient of Montenuis,²²⁰_{Aug.29} upon whom a thigh amputation was successfully performed, was 75 years old, and Wyeth,⁵⁹_{Aug.17} operated for osteitis following gunshot wound received twenty-five years before. Croucher,⁶_{Dec.15,'88} reports a recovery after disarticulation at the wrist, notwithstanding the existence of acute phlegmonous erysipelas, and Thornton,⁶_{Oct.5} a like result after amputation of the foot, in spite of syphilis, gout, and delirium tremens. Richardson,²_{Feb.16} in a case of avulsion of the leg and part of the thigh, found that there was on the eighth day after amputation a discharge of nearly a quart of cerebrospinal fluid along the track of the sciatic nerve, which had been "dragged out by its roots."

SPECIAL AMPUTATIONS.

Interscapulo-humeral operations have been reported by Chavasse,⁶_{Jan.26} for osteosarcoma (recovery); by Parkes,⁶¹_{Mar.2} 2 cases (1 recovery, 1 death); and by Lange,¹_{Feb.23} secondary to disarticulation at the shoulder. May,⁹⁶_{Dec.,'88} gives as the indications for this operation: 1. Tumors of the scapula, necessitating removal of the greater portion of that bone. 2. Tumors of upper end of humerus: (a) benign, if of such excessive size as to render amputation at the shoulder impracticable; (b) malignant, developed so far as to englobe the articulation, to invade the scapula or the muscles passing from it, the skin over the deltoid, and, above all, the lymphatic glands in the axilla. 3. Traumatic cases. These are commonly operations of necessity, including such injuries as gun- and cannon-shot wounds, with extensive shredding and laceration of integuments round the shoulder; machinery accidents, causing extensive lacerations and comminution of bones and tearing away of the entire limb.

Hip-joint has been successfully done by Post,⁹⁹_{Apr. 16} Wells,¹_{Nov. 23} and Ashhurst,⁷⁶⁹_{July 27} for malignant disease, and by Eve,⁸⁶_{May} for pyæmia following gunshot wound. Murdock's patient,⁶¹_{June 29} operated on for malignant disease, died three weeks later of secondary hæmorrhage; and Cummin's,²_{Jan. 19} for acute arthritis, a child 3 years old, died the same day of pulmonary embolism. Poppert,⁶⁹_{July 16} reporting a case which made a good recovery, in which, as a preliminary measure, the common iliac artery was tied, recommends such ligation when the ordinary means of controlling the inflow of blood cannot be adopted, and calls attention to the fact that 70 per cent. of the cases of disarticulation at the hip die of hæmorrhage.

Leg.—Hudson,⁹⁹_{May 16} calls attention to the method of operating devised by A. T. Hudson,⁹⁹₇₀ and the artificial leg to be applied to the stump thus made; and insists upon it that the longer the stump, the better and the more power of command, ease, and facility of movement does the patient have over the supplemental member.

Cathcart,³⁶_{Mar.} after careful study of the leg movements and their mode of production, also urges saving as much of the natural parts as the nature of the case permits, contending that the artificial limb-maker should, as he can, adapt the apparatus to the stump, and not require that the stump should be made to fit the apparatus,—an opinion also held by Annandale, who, in the discussion upon Cathcart's paper, maintained that “surgeons should keep themselves entirely independent of the instrument-maker's opinions. The duty of the surgeon is to amputate the limb or portion of it in order to get rid of disease or injury, and to save as much as possible of the limb. It does not matter from what position he gets the flap, provided it is one which will properly cover the bone.”

At a meeting of the surgical section of the Suffolk District Medical Society, Fisk,⁹⁹_{May 16} an artificial-leg manufacturer, claimed that “by far the best place for an amputation of the leg to be made, so far as the satisfactory attachment of a false limb was concerned, was at a point about 6 or 7 inches below the patella. Amputation at the knee-joint was satisfactory, if a good, thick flap could be got for a pad; but this was difficult, and the usual result was great inconvenience from corns and excoriations. Amputations in the vicinity of the ankle-joint ought likewise to be made so as to insure thick pads, else great discomfort would result. While an amputation in the neighborhood of the ankle-joint is, in certain

cases, the best for a patient of the poorer classes, who needs a useful limb only, a patient who can afford to pay for appearance and comfort would be best suited with an amputation performed at the point of election,—6 or 7 inches below the patella. As for amputations of the thigh, an artificial limb can be satisfactorily fitted to almost any stump."

M. Price¹⁰¹_{Feb. 16} declares from personal experience that, in an amputation of the leg, all that is left below the middle of the middle third of the leg is useless and in the way, and gives that much more room for ulceration and friction-sores.

Ankle.—Adamson,²_{Mar. 9} reports that in a Syme operation, in addition to sawing off the ends of the bones, he gouged out the cancellous tissue of the tibia for about 3 inches. The result was very satisfactory, the bone entirely filling in and forming a very useful stump. Keetley,⁹⁶_{Dec., '88} in a case in which the heel and much of the sole had been destroyed by injury and later sloughing, removed the tarsal bones and wired the metatarsals to the leg-bones. Twelve days later the foot was amputated, the soft parts from the anterior part of the sole behind the balls of the toes being placed over the ends of the freshened tibia and fibula.

Diakonoff, of Moscow, Russia, corresponding editor, calls attention to Rasoumowsky's osteoplastic operation upon children, in which the ends of the leg-bones are preserved and the posterior part of the os calcis, or a slice from its inner or outer part, according to the condition of the overlying parts, is carried up into the interval between the malleoli. This piece of the os calcis may preserve its mobility if due muscular attachments are formed, in which case the stump will functionally be very like the normal foot. Eiselsberg,⁸_{May 9} in a case of sarcoma, made a longitudinal section of the os calcis and attached one-half of the bone to the sawn surface of the tibia, the resulting shortening of the limb being about $1\frac{3}{4}$ inches.

Foot.—Helferich,⁶⁹_{Aug. 1} recommends, in the Chopart operation, chiseling or sawing off of the lower edge of the os calcis, which is apt to cause ulceration by its prominence. In one case he fixed the ankle-joint by suture, secured ankylosis, and thus prevented retraction. Milroy,²¹³_{Mar.} described to the Medico-Chirurgical Society of Glasgow a mediotarsal amputation, essentially the same as that of Forbes, of Toledo, Ohio, brought to the notice of the profession in 1874.

EXCISIONS.

General.—To promote the healing of certain wounds or ulcers, or to relieve contraction resulting in connection with this process, Annandale⁶_{Mar. 16} advises excision of a sufficient portion of the bone or bones of the limb to permit of approximation of the edges of the affected soft parts. The operation may necessitate (1) the removal of portions of bone, not including their entire thickness, as in removing a portion of the os calcis to take tension from and permit healing of an ulcer of the heel; (2) the excision of a portion of the entire thickness of a bone, or, as in case of the forearm and leg, of two bones; (3) the partial or complete excision of a joint when the contraction involves soft parts in the neighborhood; (4) the excision of a portion of the entire thickness of one or other of the bones of the forearm or leg, in order to allow the proper approximation of the ends of the companion bone, which has suffered some loss of substance.

Primary operations, according to these various procedures, will rarely be advisable in cases of great injury to the soft parts, and in the large majority of instances it will be well to delay operating until the exact extent of loss of soft parts is determined, and what the probable prospects of cicatrization may be. The experience of his cases and those of others which he quotes are encouraging.

As indicating the good results of his “moist blood-clot” method of healing, Schede⁶⁹_{June 6} brought before the Hamburg Association of Physicians 3 cases of hip-joint excision, and claimed that union could be obtained more quickly and certainly by this method than any other. Phelps¹_{Mar. 23} has employed it twenty-one times for disease of the knee-joint with good results, several times obtaining renewal of bone amounting to almost entire replacement of that removed; and, after excision of a large part of the tarsus⁵⁹_{Nov. 2} at the end of five weeks, found that there had been reproduction of the os calcis, cuboid and scaphoid, with good motion at the ankle and ability to walk well.

SPECIAL EXCISIONS.

Shoulder.—The head of the humerus was removed by Fenger²³¹_{Feb.} in a case of old luxation with benefit to the patient, the previously-existing paralysis being relieved.

Elbow.—The elbow of a man 76 years old was excised by Murdock⁶¹_{May 11} on account of disease resulting from a stab-wound

received thirty years before, the point of the dirk-knife being found imbedded. The result was a fair one. In a case of Ollier's ²¹¹_{Dec.30,'88} three excisions had to be made at intervals of five and eight months.

Wrist.—Lauenstein ³³⁶_{Oct.12} deems it useful, in order to prevent the occurrence of a flail-joint after extensive excision, to unite the dorso-radial incision in a transverse instead of a longitudinal direction, thus approximating the hand to the forearm, lessening the wound-surface, and giving the hand the desired extension.

Hip.—Schede ⁶⁹_{June 6} stated that by his method the end of the femur is brought into firm apposition with the pelvis, with the leg slightly abducted. The wound heals under the original dressing, and as soon as it is healed the patient is allowed to walk without apparatus.

Krause, ⁸⁴_{June 29} reporting on the treatment employed in Volkmann's clinic, where of 307 operations 270 were for caries, states that the plaster dressing has been given up; compression is employed, and an extension apparatus made with bands of adhesive plaster, which go as far up as the Fallopian ligament. Counter-extension is produced by the sinking of the pelvis into the bed. In severe cases only is counter-extension by weight necessary, when there exists a notable shortening; weights of 12 to 25 pounds are employed, according to the age or gravity of the case. Extension must be continued for years, even after the cure, and straightening of the limb by means of Volkmann's stringed stocking, which is applied at night only. When the adductors are too powerful they are cut. Nearly always a movable joint is obtained. Generally, passive motion is begun six or eight days after operating, and in three or four weeks the patients move about in a "walking-chair;" a raised shoe is not employed, but in very bad cases an apparatus is applied which keeps the limb in a state of abduction. In 12 cases out of 22 operated on by Podrez, according to Diakonoff, of Moscow, corresponding editor, a perfectly movable new joint was secured.

Barker ²_{Dec.15,'88} has successfully employed the anterior incision, and states that if early and complete removal is made primary union will, in many cases, be secured. Battle ⁶_{Oct.12} had a successful case of incision of both hip-joints for acute disease, the patient, after a time, being able, with proper apparatus, to get along slowly without help. Chness ¹⁴⁷_{June} reports an excision for disease probably due to injury received twenty-seven years before.

Knee.—Boeckel,¹⁶⁸_{May et seq.} in a series of articles, gives the results of his personal experience in 64 cases, the last 30 of which were all followed by recovery. Unlike his French colleagues, Ollier and Championnière, he does not use the drainage-tube. He believes that the union in adults, when it has taken place, is more solid than in children, *i.e.*, that there is less likelihood of after-flexion. The operation upon young children is favorably regarded.

Fowler⁹⁶_{June} has answered at length the question "Is resection of the knee-joint justifiable in children?" and concludes thus:—

1. Observation and clinical experience show that tuberculous inflammation within or in the neighborhood of the knee-joint, in children, leads to relative shortening of the limb, through interference with the blood-supply to the epiphyseal cartilages.

2. The amount of shortening of the limb present when the patient reaches his full growth will depend upon the extent to which the epiphyseal cartilages have been damaged and its bone-forming function destroyed by the presence of the tuberculous disease.

3. Resection of the knee-joint in growing individuals is followed by relative shortening of the limb only in proportion as the line of the epiphysis has been invaded by the disease. The extent of the disease is the only guide for the surgeon to follow in determining the amount of tissue to be removed. Those cases in which the epiphysis is spared, and in which the ultimate relative shortening is found to be considerable, are cases in which the damaging effects of the disease are responsible for the functional disability, and not the operation.

4. Resection of the knee-joint in children is justifiable. Attempts to preserve the epiphyseal cartilages where the latter are actually invaded by the tuberculous process can hold out no hope of lessening the ultimate relative shortening, and will almost certainly lead to a recurrence of the disease and the necessity for final amputation.

Miller³⁶_{July} thus describes his method of operating: "After reflecting a semi-lunar flap of skin upward, well above the patella, I cut through the tendon of the extensor of the thigh a little above the patella, and also through the fibres of the vasti, internal and external. In this way the synovial membrane is exposed, and it is then quite easy, cutting in the cellular tissue covering it, to push up the

muscular substance and to draw down the thickened synovial membrane, which comes readily off the periosteum, and has then to be cut at its attachment round the articular surface of the femur. In this way four-fifths or thereabout of the synovial membrane is removed in one mass, with the patella imbedded in it. Those portions of the membrane that cover the ligaments are then removed by the use of the Lister sharp spoon. The ligaments should be scraped till they appear clean and white. They are then cut through to permit of complete flexion of the joint, and the operation is completed by the removal of a sufficient amount of bone.

There is another procedure which I will recommend. In the old days, when a house-surgeon, I was much troubled, in dressing knee-excision cases, with the skin, which lay in a loose, redundant, and troublesome manner in folds over the approximated bones. To remove this redundant skin I act as follows: After making an incision from behind the one condyle to behind the other, across the front of the knee and at the level of the top of the tibia, I make another cut, commencing and terminating at the same points, but over the centre of the patella. These two incisions include an elliptical portion of skin, which is left attached, and the skin is dissected up over the synovial membrane from the upper cut, as described above."

Lauenstein⁶⁹_{July 11} holds that if, in removal of the diseased capsule, the crucial ligaments are cut, ankylosis will result; to prevent which he suggests the chiseling off from the head of the tibia a wedge-shaped piece of bone with the ligament insertions, and later replacing and fastening it. Koenig states that he has seen movable joints after these ligaments have been cut, and Petersen, two years after the removal, found them in part reformed.

Neugebauer,³⁰¹_{B.24,H.4} as the end results of 101 resections (71 total, 30 partial), reports 63.3 per cent. complete recoveries, 17.8 per cent. partial, and 8.9 per cent. recoveries after amputation. Ten deaths occurred, mostly from tubercular lung disease, though there was 1 each from sepsis, tetanus, erysipelas, and tubercular meningitis. Eight patients died years later of visceral tuberculosis. In most of the other cases the disease seemed to be completely eradicated. Permanent fistulae remained in 2 cases. In 47 cases a useful limb was the result; in 11 the functional value was but slight (because of flexion in 3, of shortening in 8). As respects shortening,

an interesting case is reported by Petersen,³³⁶_{Oct.5} in which excess of growth in the upper end of the femur made up for nearly $3\frac{1}{2}$ inches taken away at the knee. Ollier¹⁵²_{May 13} states that such overgrowth in connection with any long bone is most likely and most marked when the preserved end is that at which growth normally takes place.

Arthrectomy was done by Wolfe⁴_{Feb.11} in a case of Charcot's disease, with good result.

Ankle.—To gain room for operating and to save more of the leg-bones, Ollier³_{May 15} advises removal of the astragalus. In a case of Huntington's¹⁴⁷_{Jan.} this bone and $2\frac{3}{8}$ inches of the tibia and 3 inches of the fibula were removed on account of necrosis, recovery taking place.

Arthrectomy of Ankle.—Schmidt³³⁶_{Jan.12}; ¹⁷⁰_{Apr.} recommends, in removal of the synovial membrane of the ankle, a longitudinal incision in front, between the tibia and fibula, and one in the rear of the joint to the outer side of the median line. If necessary, the posterior part of the os calcis may be vertically separated, and thus freer access secured to the joint without interfering with the tibial vessels.

Wladimiroff-Mikulicz Operation.—Chaput³_{July 31} reviews the advantages and disadvantages of this operation, and thinks that it should not be regarded as a substitute for partial excisions of the foot, excision of the ankle, or amputation of the leg, but as a special operation, having its proper and clearly-indicated place. Following the presentation of a patient upon whom Chaput had successfully operated, a report was presented to the Society of Surgery of Paris by Berger,⁹¹_{June} who has somewhat modified the operative procedure by making an inverted T-incision, the vertical arm of which follows the posterior border of the fibula, and the horizontal along the outer border of the foot extends from the posterior extremity of the os calcis to that of the fifth metatarsal. Ollier, in the discussion which followed, stated that he had for four years been searching in vain for a proper case in which to do the operation, the value of which he thought was yet to be determined.

RESECTION OF BONES.

Spine.—Dawbarn,¹_{June 29} in a case of fracture, removed the posterior arches of the tenth, eleventh, and twelfth dorsals, some improvement of the patient's condition resulting; White,⁹⁶_{June} the spines

and laminæ of first, second, third, fourth, and fifth dorsals for focal spinal lesion, with, after improvement, the spines and laminæ of the ninth, tenth, and eleventh dorsals on account of Pott's paralysis, death ensuing; Duncan,³⁶_{Mar.} the spine and laminæ of the fourth, fifth, sixth, and seventh dorsals for paralysis from caries, followed by improvement.

Sacrum.—Wiedow,⁴_{Mar.11} in a paper on the osteoplastic resection of the sacrum in order to open the way to the female sexual organs for operative purposes, regards the operation as of service (1) in reaching certain abscesses difficult of access or (2) slightly adherent ovaries or small tumors of the tubes; (3) in ligaturing the uterine arteries or the spermatic plexus; (4) in extirpation of the uterus, for which the operation is much better suited than the vaginal method, as one can see what is being done.

Sternum.—In concluding an article on the resection of the sternum,³³⁶_{May 25} Steinheil asserts that (1) the sternum can be successfully resected in part or in its entirety. 2. The difficulty of the operation depends upon the extent of the resection, the portion resected, the cause of the operation, and the method employed, whether subperiosteal or not. 3. In complicated fractures, especially when resulting from gunshot wounds, the result of the resection depends upon the course of the wound. 4. Chronic inflammatory processes are the most frequent indications for resection of the sternum. The subperiosteal method is attended by the greatest success; frequently osseous regeneration will follow. The operation is frequently performed for the removal of tumors of the sternum and mediastinum, and also to form an opening in the chest through which the larger vessels may be tied.

Ensiform Cartilage.—Rinonapoli,⁶_{Mar.16} has reported to the Royal Academy of Medicine and Surgery, Naples, an instance of removal of an ensiform cartilage displaced backward, with recovery in five weeks. The points of interest connected with the case are: 1. That it is only the second recorded. 2. The peritoneum was not opened. 3. It was undertaken by a young surgeon in a country district in Italy, who, with the assistance of two other country surgeons, carried it through in the most praiseworthy manner.

Clavicle.—Removal has been reported by Folker,²_{Feb.9} for faulty union, and by Jessett,⁶_{June 1 et seq.} Tansini,⁵⁰⁵_{May 15} and Rouse,⁶_{Mar.22} for sarcoma. Jessett tabulates 16 cases that he had collected. In a case of

Despres, ³_{Apr.3} after recovery it was found that almost all the movements of the arm were possible. The only one that could not be made was that of putting the hand behind the neck and back part of the head. The clavicular part of the greater pectoral had attached itself to the first rib and the clavicular part of the trapezius to the parts in the vicinity of the coracoid process.

Upper Extremity.—Cases of entire removal of the humerus, with preservation of the forearm, are reported by Polaillon, ³_{Mar.23} and Buffet ²⁰³_{May 15} for chronic osteomyelitis, following gunshot wound received thirty years before, and for osteosarcoma. Berger advises saving, when possible, the lower end of the humerus in order to give more ease and extent to the movements of the wrist and hand. By Jay ⁵_{Oct.} the entire ulna and the articulating end of the humerus and head of the radius were successfully removed, with preservation of motion at the elbow through several degrees. The humerus and radius were, at the time of the operation, united at a right angle by silver-wire sutures. Briggs ¹²⁰_{Dec., '88} has had to take away the lower half of the radius on account of necrosis following fracture.

Lower Extremity.—Successful removals of the patella for necrosis have been reported by Page ⁶_{Mar.16} and Gibney, and of the entire shaft of the fibula by Clay ⁶_{June 19} and by Polaillon. ¹⁷_{Dec.11,'88}

Regenerations have been observed of the patella by Gibney, ⁵⁹_{Apr.18} and of the entire shaft of the tibia by Vincent ²¹¹_{Feb.24} and Mikulicz. ⁶⁹_{Aug.1}

Removals of the astragalus in cases of club-foot have been made in 2 cases by Renton ⁹_{Mar.16} and by Schwartz, ³_{Feb.6} in the case of the latter the scaphoid also having been taken away. The operation is commended by Championnière, especially in patients about 14 or 15 years old. An old luxation was treated by excision by Dukeman, ¹_{Feb.23} with the result of securing an almost perfect use of the foot.

The os calcis has been successfully excised by Nancrede ⁹_{June 22} and by Barton, ⁷⁶⁰_{Aug.13} and the entire tarsus, with the exception of the os calcis, by Jones. ²_{Jan.12} For the relief of painful contractions consequent upon a scar pressing upon the rounded knuckle-like projection of the plantar surface of the os calcis, Abbe removed such projection, leaving a flat surface upon which pressure might come.

Neve ⁵_{Mar.} has written an interesting paper on resection of long bones; Heydenreich ³_{Apr.10} another on anterior total tarsectomy.

OSTEOTOMY.

For vicious union after fracture of the lower end of the radius, Harte¹¹²_{Aug.} has twice secured a very satisfactory result by section of the bone and adjustment as for recent fracture.

Laplace,⁹_{Nov.2} for the relief of overlapping in the femur to the extent of 6 inches, cut the fragments apart and apposed them.

In the ANNUAL of 1888 notice was taken of Defontaine's trochleiform osteotomy. In a recent case Defontaine secured a movable joint. Koenig³³⁶_{No.1} has for some years used chisels from 1½ inches to 2 inches in breadth, and has found that he can thus divide the bone very speedily and without the exercise of much force. In operating upon the femur the chisel is not applied at right angles to the long axis of the bone, but obliquely from below, and inward, upward, and outward. An osteotomy thus performed is usually completed in a few minutes, except in cases of adult subjects, in which a longer time is required.

DISEASES OF BONE.

Tuberculosis.—Dollinger,⁸¹_{Apr.27} as the result of investigation into the family history of 250 cases, found that in more than one-third of them one or more of the immediate ancestors had suffered from pulmonary phthisis,—usually the grand-parents,—so that he has come to the conclusion that the influence of the tuberculous virus must be exerted through several generations before the normal resistance of the osseous structures is so far weakened that they become a suitable field for the lodgment and development of the tubercle bacillus; in other words, that in inherited tuberculosis the lungs are attacked in the first, the bones in the second, generation. By experimental injections Pavlovsky,⁵⁸⁶_{Nov.29,30} found that, in the synovial membranes at least, the infection passes by continuity from cell to cell.

For the first time, the occurrence of tubercular disease in the snake in captivity has been noticed by Sibley.²⁰_{Apr.}

Kollman,⁸⁴_{Mar.31} believing that caries is due to the presence in excess of lactic acid in the blood, has green soap rubbed in two or three times a week along the spine, upon the thighs, and over the popliteal space, and claims that by this treatment he has cured every case in from eighteen days to as many months, the average time being four and one-half months. As the treatment also in-

cluded rest, the administration of cod-liver oil, etc., the value of the soap applications may be questioned.

Injections of iodoform ether, after the method of Verneuil, are not favored by Dollinger,³³⁶ May 18 who found that in children they did not induce recovery in a single case; that injection of small amounts produced deafness, headache, and nausea; of larger quantities, loss of consciousness, impaired respiration, and acute cystitis. At the moment of injection some headache may be felt, and there may be an evening rise of temperature of 3° or 4° F. (1½° to 2° C.). The rapid evaporation of the ether may cause necrosis of the abscess-wall, and if, for example, a psoas abscess should burst into the peritoneal cavity, death might result from such an injection.

Wendelstadt,³³⁶ Sept. 21 believing that iodoform has much power to stop the formation of giant-cells, to destroy the infecting properties of the abscess-pus, and to cause the disappearance of the tubercles in the abscess-walls, advises the parenchymatous injection of iodoform oil (1 part to 5). Of the cases treated (109), one-third were apparently cured and as many more improved. The small amounts injected (2 to 3 cubic centimetres—32 to 49 minims) will not cause any iodoform poisoning.

Ceccherelli²¹² Feb. regards tannin as much better than iodoform, employed in powder or in alcoholic solution on gauze; or given internally, when Raymond says it acts as mercury does in syphilis. Schoff and Rabl⁵⁷ Apr. 14 report favorably on the use of balsam of Peru after the method of Landerer.

Stocquart²⁶ May found the external use of sulphate of copper 4 parts, vaseline 30 parts, and later the internal administration of the neutral acetate of copper ($\frac{1}{3}$ grain—.0216 gramme), of decided benefit in a case of disease of the wrist-joint.

Feuret⁵⁹ Mar. 30 treated tuberculous ulceration by applications of camphor 2 parts, naphthol 1 part. In wound tuberculosis Martell¹¹³ Mar. 3 et seq. prefers calomel to corrosive sublimate, as it lessens pain and favors granulation, and is not poisonous as is the sublimate, at times even in strength of 1 to 4000.

Albert⁵⁷ Apr. 16 holds that the three main elements of conservative treatment are food, air, and exercise. Iron, iodine, cod-liver oil, arsenic, etc., are of no special value, but favor the prevention of generalization and help in the destruction of the bacilli by the body-cells. Abbe¹ Feb. 16 presented to the New York Clinical Society a

child, 6 years old, in whom rest and country air had produced so great a change for the better in a tuberculous knee that all sinuses were healed and the boy had a good leg, on which he could walk or run with but little inconvenience.

As to surgical treatment, Albert⁵⁷_{Apr. 14} thinks well of arthrectomy (not simple scraping, for it is too uncertain how much is removed), and holds that the day of typical resections is past, though he believes that conservatism, that often gives a better ultimate result than an operation, is not enough regarded, especially in the treatment of children. In 30 cases of suppurative hip-joint the result was as good as it could have been after excision. In tarsal and carpal disease after operation recurrence must be expected, but as the operation is devoid of danger he does not oppose it. Redard³⁵_{May 23} believes that in a large number of cases of ankle and foot disease in children excellent results can be secured by incision, scraping, cauterization, and drainage.

Poels,²⁸⁸_{Aug. 11} as respects the time of doing excisions, states that the operation, contra-indicated in the earliest stages, is of especial service when suppuration has occurred. It is indispensable in the later stages, when recovery may be secured if visceral degenerations have not taken place, and may even then much prolong life. Among the many general papers that have appeared, attention may be called to those of Fenger,⁶¹_{Oct. 26} of McArdle,¹⁶_{Feb. et seq.} in which the advantages of drainage of the affected area are set forth, and the preferable sites for trephining in order to secure such drainage are figured and described; of Barker,⁶_{Jan. 19} and of Baudouin,¹¹⁸_{Dec., '88} in which cervical Pott's disease is considered at length.

Sacro-iliac Disease.—Van Hook⁹⁶_{Dec., '88, et seq.} concludes an elaborate paper by stating that (1) sacro-iliac disease is not directly amenable to treatment by drugs. They should, nevertheless, be employed by the surgeon in all forms of disease when they are likely to improve the general condition of the patient. 2. Counter-irritation is indicated when there is pain, lameness, or tumefaction at the joint, without abscess formation. The actual cautery seems to be the most effective form. 3. Mechanical rest, which is also physiological rest, is the treatment *par excellence* where no abscesses are present. 4. When abscesses have formed, radical operative interference must be immediately resorted to. 5. If the abscesses are extra-pelvic they should be operated upon by direct

incision and évidement. 6. When the abscesses are intra-pelvic the operator should approach the disease focus, supposedly in the anterior of the joint, by an opening made above the joint proper. 7. When both extra- and intra- pelvic abscesses are present the external abscess should be first opened, and the opening between the two, if possible, so enlarged as to admit of radical treatment of the deeper focus of disease. 8. Radical operations cannot be made through long sinuses. 9. Drainage alone is not likely to be successful. 10. After-treatment should include, besides antisepsis, continual rest, aided, when necessary, by the extension and pelvic belt. 11. When radical operation is undertaken no tubercular matter should be left behind. Cases have been reported by Leplat,²²⁰_{Jan. 25} Hektoen, Herrick and Parkes,¹¹⁵_{Sept.} and by Collier.⁶_{Oct. 19} In Hektoen's case the pus passed subperiosteally under the posterior ligaments, so as to cause intra- and extra- pelvic abscesses. Collier urges trephining of the sacro-iliac joint in all cases where suppuration is threatened or pain is severe.

Osteomyelitis.—Park,⁵_{July} in a paper read before the Philadelphia Pathological Society upon acute infectious processes in bone, regards it as established that (1) there is no one specific microbe for the production of acute infectious processes in bone. 2. Most, if not all, of the staphylococci can cause them. Exceptionally, the streptococci may exert such an influence; so may tubercle bacilli and those of typhoid. 3. Commonly, when these latter are met with, we have to deal with a mixed infection, the pyogenic cocci being the final and active destructive agents. 4. Of all forms the staphylococcus is the most pernicious. 5. The parasitic infection may occur through the ears, eyes, nose, mouth, pharynx, respiratory passages, mucosa of the alimentary canal, or skin; or, in other words, through any lesion of the external or internal body surfaces; furthermore, from any subcutaneous phlegmon, however small. 6. The infection need not necessarily have been recent. The staphylococci and the bacilli of tubercle have the property of hibernation, so to speak, and their period of latency is one of almost indefinite length; this is especially true of the former. 7. Some predisposing condition will usually be found to have favored the entrance of the infectious germs into the system and their lodgment in the localities where they manifest most activity. 8. Of the general causes which favor their entrance, the

diathetic conditions, such as the tubercular, and the dyscrasial, like the syphilitic, also the post-febrile, play a most conspicuous part. Age, *i.e.*, childhood, is also always a predisposing cause. 9. Of the causes which favor lodgment in particular localities, exposure, exhaustion, strain, and more-marked traumatisms are those usually met with. 10. Pathologically, a case of acute infectious osteomyelitis becomes, within a few hours, a case of localized pyæmia, with all that the term implies; and this, within a few hours more, may become so generalized that a patient may die, even within thirty-six hours after noting the first symptom, of overwhelming septic intoxication. 11. Acute infectious periostitis may run almost as acute a course, locally, as the same grade of osteomyelitis; but, inasmuch as pus finds more readily an outlet, it seldom leads to as rapid general disaster.

In 2 cases reported by Cauchois²⁰³_{Sept. 15} the germs were believed to have found entrance in 1 through an injured toe, in the other through the urethra affected with gonorrhœa, and in a patient of Braquehay¹⁸⁸_{Nov. 10} from a generalized furunculous eruption existing at the time of the injury. Bobroff¹¹³_{Feb. 24} holds that they do not come in through the intestinal tract, being filtered out in passing through the liver. Küster⁴_{Jan. 14} found that of 271 cases at the Augusta Hospital, since 1871, in 19 the disease followed old and healed gunshot wounds, and in 14 a former well-healed osteomyelitis,—in 1 case after thirty years.

Diakonoff, of Moscow, Russia, corresponding editor, reports that Bobroff has found that the disease attacks, in order of frequency, the lower end of the femur, the upper end of the humerus, the upper end of the tibia, most rarely the short and flat bones. This depends, it is believed, upon the direction of the nutrient arteries, the causative microbes being most readily held in those parts in which the blood-pressure and the swiftness of current are least.

The prognosis is grave, yet, even when a number of bones are attacked, it is declared by Hahn⁴_{June 3} to be much more favorable than that of pyæmia, which the disease so much resembles, and from which it is often diagnosticated with so much difficulty. Attacking the upper end of the humerus, Forestier²¹¹_{Aug. 25} has seen a resulting shortening of 5 inches and Wyeth¹⁰¹_{May} caries of the head. In a case²¹⁴_{June 15} observed at Zürich, the breast, arms, thighs,

and gluteal regions were covered with ecchymoses and a small, pustular eruption, and a pemphigus-like eruption was on the abdomen.

Early incision and thorough cleaning, with or without resection, according to circumstances, is advised by all. As Park expresses it: "There is to-day but *one* safe and rational treatment, and that is early and radical operation." When in the upper end of the femur separation of the shaft has taken place, Thelen,²²⁶_{No. 38} who has reported 14 cases, directs the employment of the extension treatment, which will often secure a good result. An interesting and well-illustrated paper on resections was presented to the Anatomical Society of Paris by Marchant.⁷_{No. 17}

In operations upon the lower end of the femur, Kirmisson calls attention to the possible danger of injury to the popliteal vessels from the pressure of the drainage-tube, and advises that its ends should always be brought up and so fastened that its concavity may look toward the posterior surface of the bone. In this connection notice may be taken of de Larabrie's case of perforation of the popliteal artery by a free sequestrum from the femur.

Following typhoid fever, 2 cases were observed by Muttart,¹¹²_{Oct.} 1 of the femur and tibia, and 1 of the ribs; and 3 of the ribs by Potter,⁷⁷_{Oct.} believed to be due to antifebrin administered during the fever; 1 of the patella, and 1 of the tibia, radius, ulna, and sternum, by Schwartz,³⁵_{June 6}; and 1, affecting several bones, by Kirmisson.¹⁴_{Jan. 6} Braquehay,¹⁸⁸_{Nov. 10} reports a case following scarlatina.

Sawtschenko,⁵⁰_{Apr. 20} publishes an article on *osteomyelitis leprosa*. He has found foci in bone from the size of a mustard-seed to that of a pea, but no exuberant granulations, as in tuberculosis. The disease is very chronic, and shows a tendency to the formation of scar-like contractions. The cause of the bone changes is the lepra bacillus, which acts with less energy and produces less damage than does the tubercle bacillus. The organisms are found both inside the cells and in the lymph-spaces, those in the latter coloring more intensely. The vacuoles in the cells are probably filled with mucoid excretions from the bacilli.

Toussaint,³⁵_{Feb. 14} and Levy,⁴_{Nov. 11} have written upon the disease as met with in mother-of-pearl workers, the latter calling attention to the fact that the swelling begins near the epiphyseal line and may extend along the shaft, but will not affect the epiphysis or the

joint. In addition to the 25 cases that have been observed in Vienna, he has found 5 in Berlin.

Syphilitic Osteitis.—This is, according to White,¹¹² to be distinguished from tubercular osteitis by its attacking persons of very different physical conditions, by its tending to form new bone or causing necrosis, by there often being no suppuration induced, by its not involving neighboring articulations, by its frequent occurrence in cranial bones, and by the favorable result that usually follows proper treatment.

Osteitis Deformans.—Pozzi,²⁶_{Feb. et seq.} has reported 3 cases, Clay²_{Mar. 23} and Lloyd each 1. Spencer²_{Apr. 6} and Walley⁶_{Apr. 13} have seen in goats a disease having points of resemblance to mollities ossium, osteitis deformans, and multiple sarcoma.

Kortüm⁵⁷_{Dec. 23, '88} points out the dangers attending the local application of even weak solutions of carbolic acid (from 8 per cent. to even 2 or 1 per cent.) to the fingers and toes of children and those of feeble and incomplete development, necrosis of bone and gangrene of the soft parts being induced, recovery from which takes place very slowly.

Osteoperiostitis of the radius, consequent upon a fall, was at first mistaken for fracture in a case which later came under the care of Verneuil.¹⁷⁷_{July 8}

BONE-GROWTH.

Schüller⁴_{Jan. 14} has considered at some length the artificial increase of the growth of bone in man, akin to that which has long been known to take place as the result of various chronic inflammatory processes of moderate intensity, especially in the shaft. His method of producing such increase is by (1) causing a constant passive hyperæmia of the part by means of a constricting elastic tube; (2) placing the patient in such general condition as will best favor bone-growth; (3) by the use of local measures calculated to promote such growth; and (4) by local operations, such as the antiseptic insertion of nickel-plated steel pins. He does not agree with Ollier, Helferich, and Haab, that the nearer the irritation is to the epiphyseal cartilage, the greater the danger of arrest of growth, which he thinks is disproved both by experiments and by the results of disease. In 28 per cent. of the cases of necrosis of the lower end of the femur in the Leipsic Clinic, elongation was noted. Even disease of, or operation upon, the epiphyseal cartilage

itself does not necessarily cause shortening, especially if the irritation is aseptic; so that the surgeon need not confine himself to the middle of the shaft in operative proceedings intended to cause increase in the growth of the bone, but had better set up his aseptic irritation near the epiphyseal line. These proceedings are to be continued or renewed as long as there are differences in the growth of the two limbs, though no benefit need be expected from them after the expiration of the natural period of bone-growth. Much and constant attention should be paid to the general constitutional and hygienic treatment, and no part of the "combination treatment" should be neglected.

Mikulicz⁹_{July 6} has successfully employed turpentine as an excitant for the production of osseous tissue, *e.g.*, in cases of pseudarthrosis. He makes a longitudinal incision through the soft parts and periosteum at the site of fracture, and raises the periosteum; in the space thus formed he stuffs gauze soaked in oil of turpentine, renewing the dressing every second or third day, this being effected without much pain. Bergmann has not found this agent of service. In a case of unequal growth of the tibia and fibula, Ollier, to stimulate the development of the former bone, excised the fibular cartilages, made an incision the whole length of shaft of the tibia, stripped up the periosteum, and drove in a lead nail.

In studying the arrest of growth in connection with 47 cases of tubercular disease of the knee, Dollinger³³⁶_{Dec. 9, '88} found that as long as the inflammation continued there was no arrest; the part might even grow with abnormal rapidity, but shortening began when inflammation and hyperæmia ceased, its ultimate amount varying according to the extent of the inflammation, etc. Whether or not arrest of growth was influenced by straightening or using the limb he could not determine, but saw no case in which increased growth followed such manœuvres. Excision involving the cartilage, he regards as certainly a cause of shortening, but, since shortening occurs when the diseased cartilage is spared, he deems the arrest due to the disease and not the operation. His tables show in some cases an arrest of growth to the extent of $3\frac{1}{2}$ to $4\frac{1}{2}$ inches,—even 8 inches in one case,—amounts which are seldom exceeded after resections in children.

Bone-Grafts.—Senn,⁵_{Sept.} as the result of numerous experiments made with antiseptic bone-grafts, declares that (1) antiseptic

decalcified bone is the best substitute for living bone-grafts in the restoration of a loss of substance in bone. 2. In the treatment of bone-cavities, antiseptic decalcified bone is preferable to Schede's blood-clot, as it is not only a perfectly aseptic but, at the same time, also a strongly antiseptic substance. 3. Implantation of a disk or plate of antiseptic decalcified bone into a cranial defect may be relied upon as a hæmostatic measure in arresting bleeding from the vessels of the diploc; it constitutes a good temporary substitute for the lost portion of the cranium, it prevents the direct union of the brain or it envelops with the pericranium, and, finally, it furnishes the most favorable condition for the production of new bone from the margins and closure of the remaining defect by a firm and unyielding membrane. 4. The packing of an aseptic bone-cavity with chips of antiseptic decalcified bone guards against unnecessary loss of blood, and exerts a potent influence in the prevention of infection by pus-microbes that might have remained upon the surface of the wound or in the tissues. 5. Capillary drainage by an absorbable drain should be established after implantation, for the purpose of preventing the accumulation of more blood in the wound than is necessary to form a temporary cement substance between the bone-chips and between the contents of the cavity and the surrounding tissues. 6. In the treatment of an aseptic bone-cavity by implantation of chips of antiseptic decalcified bone, the packing answers the purpose of an antiseptic tampon, and furnishes the best medium for the growth and development of the tissue resulting from the regenerative process initiated by the trauma. 7. Secondary implantation can be successfully practiced in the treatment of a suppurating bone-cavity after suppuration has ceased, and the cavity can be transformed into the same favorable conditions for healing as an aseptic wound.

Hopkins^{9 July 18} has found that when sterilized dead bone is placed in contact with living bone, under favorable circumstances it undergoes absorption; when placed in contact with periosteum it undergoes organization. These processes go on most actively between the fifth and eighth weeks, and are not associated with inflammatory action. Adamkiewicz deems it of great importance for osseous union that direct contact takes place between an implanted piece of bone and the border of the surrounding bone, as otherwise the union is by the formation of connective tissue.

Seydel,³³⁶_{Mar. 23} in a case of fracture with loss of substance of the parietal bone $2\frac{1}{2}$ by $1\frac{5}{8}$ inches, filled in the gap with thin pieces chiseled off the tibia, upon which the periosteum was retained. The result was very satisfactory. In future cases he intends to close the scalp wound directly after the transplantation, as this favors the healing of the implanted bone-fragments.

For closure of large gaps after sequestrotomy, Lücke⁴_{Oct. 28} chiseled off wedge-shaped pieces of bone on the sides and turned them in. In one case the patella was used.

Poncet²¹¹_{Oct. 9} reports successful employment of bone-grafts after removal of the tibia. In a case of knee excision White¹¹²_{Jan.} used the metacarpal bone of a dog to fix the femur and tibia, which answered the purpose, but so far as could be determined neither hastened nor aided bone development. Hopkins,⁹_{July 13} holds that where dowel-pins are used for any mechanical purpose in surgery, they may be relied upon for a period of a month or six weeks. After this, their services being no longer necessary, they gradually disappear.

BONE-TUMORS.

Exostosis.—A tumor of this sort springing from just below the anatomical neck of the humerus was removed by Hungate,⁷⁶⁰_{June 1} with resulting full restoration of the movements of the arm and shoulder. In a case of McBurney's, and one of Weir's over an exostosis of the femur, there was found a bursa, which, in McBurney's case, held 3 ounces (88 grammes) of bloody serum.¹_{Mar. 20}

Cases of multiple exostoses are reported by Leidy,¹¹²_{Jan.} Campbell,²¹³_{Feb.} Clarke,²_{Mar. 23} and Ollier.²¹¹_{Mar. 24} In Campbell's case the tumors, "small and large, were almost innumerable;" in Clarke's they involved all the bones of the body except those of the skull ("his brother and father had been similarly affected"); in Leidy's case they numbered one hundred and twenty-six. The largest out-growths were found upon the following: Right and left femur, tibia and fibula, pelvis, left scapula; seventh, eighth, ninth, and tenth left ribs anteriorly; sixth, seventh, and eighth right ribs posteriorly. Growths of variable sizes were found upon the metatarsal and carpal bones, phalanges; ulna, humerus, clavicle, ribs, ilium, and ischium. Upon the shafts of several long bones were elevations which conveyed the sensation as though shot had been imbedded beneath the periosteum. The bones of the skull were not affected.

The foregoing outgrowths, variable in size and shape, were all of stony hardness, both pediculated and sessile, and smooth and irregular upon the surface. Pain, which was the principal symptom in Campbell's case, was purely mechanical. Deep pressure failed to elicit any marked tenderness; friction of the superficial tissues, on the other hand, gives rise to severe pain. Spencer²_{May 20} found these multiple bone-tumors upon a dog.

Malignant Tumors.—Of the many cases reported notice can be taken of but few. Billings⁹_{Nov. 16} has had three of the spine, and in his paper upon the subject he states: "Spinal osteosarcoma springs usually from the lumbar or lower dorsal vertebræ. It may grow from the bodies of any part of the spinal column, and, like other sarcomata, grows with variable rapidity. The tumor is usually globular or ovoid, is generally encapsuled by the periosteum and surrounding connective tissue. If it occur on that part of the column which renders the tumor palpable, it is found hard and resistant to the touch, and usually immovable, because of inflammatory adhesions to the surrounding tissues or organs. One important characteristic is the early involvement of the lymphatic vessels and glands, especially those near the tumor."

In a case of Verneuil's¹⁰⁰_{Jan. 22} a tibia, the seat of an osteosarcoma, was twice broken at a year's interval. A recurrent ischio-coccygeal sarcoma was removed piecemeal by Péan.²_{Mar. 23} A patient of Lloyd's⁶_{Apr. 13} had growths upon the left clavicle, right ilium, and left ninth and tenth ribs. Poncet¹⁰⁰_{Feb. 19} calls attention to the difficulties attending the diagnosis of a subperiosteal sarcoma of the femur under his care. It extended the whole length of the shaft, and there was associated secondary sarcoma of the lung, spleen, and glands. A very interesting case of pulsating tumor of bone in a pregnant woman, which was thought to be one of hæmatoid sarcoma, but which later spontaneously disappeared, is reported by McDonnell.¹⁶_{Jan.}

Actinomyces.—In a discussion at the St. Louis Medical Society, Bremer⁸²_{Jan. 12} stated that he had once seen this disease and tuberculosis existing together in the lung.

Rider's Bone.—Cases are reported by Lalesque¹⁸⁸_{Jan. 6} and by Orlow.⁸⁴_{Dec. 22, '83} The latter states that the bone formation, which usually occurs in the adductor longus, the pectineus, or the adductor magnus, may be in the tendons as well as in the muscles; and may

develop slowly from continued irritation or rapidly after severe injury, in the former case the osteoma probably resulting from ossification within the muscles, in the latter from detached splinters of bone or pieces of periosteum.

Pearl-Tumors.—Virchow⁴_{May 18} presented to the Berlin Medical Society a specimen of pearl-tumor (cholesteatoma, or, as Virchow would prefer to call it, margaritoma) found in the petrous portion of the temporal bone,—a locality in which he has seen such growth developed fifteen times in the last twenty-four years, in one case exceeding in size a hazel-nut. He regards these tumors, which have never been met with except in connection with the skull, the brain, or its coverings, as genuine tumors, of heterotypic-epidermal nature, into the composition of which cholesterin enters, but as a secondary constituent. Of roundish form and pearly appearance, their presence is in most cases associated with suppuration and caries; when in the temporal bone they generally lie in cavities in the upper and outer portion.—at times push through into the cranial cavity. Scales like pieces of onion-peel often separate and are carried out with the pus, the recognition of which clears up the diagnosis, though there is some danger that discharged flakes of pearl-like epithelium from the external auditory canal may be mistaken for them.

DISEASES OF JOINTS.

General Treatment.—Illingworth, of Accrington, Eng., collaborator, writes that acute inflammations are rapidly cured by the salicylates, with aconite or digitalis for the liquefacient and depressant indications. These may be supplemented by calomel derivative when there is costiveness, by acetanilid (liquefacient), by cantharides (local derivative), and, subsequently, when resolution is delayed (and there is thus a danger of inducing toxic effects from the salicylates), by the nitrate, iodide, and carbonate of soda, and the carbonate of ammonia (as liquefacients).

In traumatic synovitis hot sublimate solutions, 1 to 1000, have been used with benefit by Hungate.¹⁰²_{Dec., '88} In acute suppurative synovitis Mayo Robson⁶_{Jan. 12} advises early aspiration, followed, if necessary, by free incision and drainage.

Chronic Inflammations.—Conservatism is strongly urged by Judson⁵⁹_{May 18} and the great importance of rest is insisted upon by McKensie.³⁹_{Jan. 18} In proof of the curability without operation of

severe and advanced disease of large joints, Hewson⁶¹_{Feb.2} reports 3 cases—1 of the hip, 1 of the wrist, and 1 of the elbow—in which the local employment of dry earth and sulphuretted-hydrogen and carbonic-acid gases was followed by excellent recovery in each case.

Salicylic acid has been found by Lovett⁹⁹_{Apr.11} of great value when night cries are present; when the diseased joint is very painful and sensitive to jar; when vomiting and general discomfort are associated with an increase in the local disease. Relief from pain and diminished sensitiveness follow at once, as quickly as an acute articular rheumatism, and the drug should be given in as large doses as for that affection until the pain is relieved or the physiological effect is produced.

In cases of spastic contraction, Lorenz⁸_{Nov.} recommends, as the simplest and surest treatment, the injection into the joint of a hypodermic syringeful (or half that quantity) of a 10-per-cent. solution of cocaine. Immediately after the injection the pain disappears, and a few minutes later the joint may be put into the correct position and fixed or extended. This mode of treatment is especially recommended for the correction of spastic club-foot. Children bear cocaine very well; in adults more caution is necessary, a few centigrammes often being sufficient to produce the desired effect.

Massage.—Greidenberg²⁰⁰_{Oct.} describes 6 cases of chronic synovitis (of traumatic, rheumatic, and gonorrhœal origin) treated and cured by massage. The *séances* were repeated once daily, lasting each time from fifteen to twenty-five minutes. Basing his views on the series, as well as on a number of other similarly-successful cases, the author lays down the following general propositions: 1. In the absence of fever, tenderness about the joint by no means constitutes any contra-indication in regard to massage. 2. The same may be said in regard to the increase of pain which very commonly follows the first or even the second *séance*. It is advisable, however, to inform the patient beforehand about the possibility of such an occurrence. 3. In the presence of more or less considerable or relatively inveterate organic changes about the joint, only a prolonged (*e.g.*, two months) treatment can secure satisfactory results. 4. Any forcible passive movements should be strictly avoided, since they are apt to bring about only aggravation of the joint's condition generally; the masseur's device should be

“festina lente.” 5. In old people good effects of the massage treatment develop but very slowly. On the whole, all other conditions being equal, the prognosis in the old is by far less favorable than in the young. 6. The massage treatment should be resorted to only after an acute arthritis has passed into a subacute stage, or after the inflammation has subsided altogether, having left such changes as connective-tissue adhesions between the articular surfaces, cicatricial contraction of the articular capsule, consecutive immobility of the joint, atrophy and paresis of the periarticular muscles, etc.

As respects operative treatment in general, Riedel³³⁶_{No. 2} declares that every osseous change which leads to the formation of the sequestrum necessitates operation at all ages. The presence of a sequestrum is chiefly indicated by the formation of abscesses, great pain, and the occurrence of contracture; but these symptoms are not always to be relied upon.

Every osseous change which limits itself to the formation of granulations, especially caseous foci without a sequestrum, as well as every case of primary tuberculosis of the soft parts, requires operative treatment. This is true in the case of adults over 17 years of age, if these processes originated at that age, or if, beginning earlier, they have recently undergone exacerbation. It is true also in children, if the ankle- or wrist- joint is diseased.

If these two processes have their seat in either the knee or elbow, operative interference should be postponed if possible. If the shoulder- or hip- joint is affected they should still more carefully be avoided, especially in coxitis. Suppuration indicates operation in these cases.

Synoviotomy.—Bird,²⁸⁵_{May} in a case of long-standing disease of the knee-joint, under chloroform divided the hamstring tendons and drilled the femur in several places, the outer shell of which was very thin indeed, and the interior very soft and laden with fat from chronic inflammation and disuse. The synovial membrane was then sliced freely on both sides of and above the patella with a long tenotome; in this way the swollen tissue was scored in ten or more places. There was more hæmorrhage than usual in this case. Sponge-pressure was firmly applied and the limb placed on a splint; there was no pain afterward. At the end of a fortnight the tenderness had entirely gone except at one point on the

inner side, where there had been some extravasation of blood, and the swelling was much lessened. The boy's health rapidly picked up and is now very good; instead of looking as if he were dying of hectic, he has become strong and healthy. His limb is a useful, painless one, and more motion is obtained than before.

Hysterical Affections.—Both Petersen⁶⁹_{May} and Esmarch have happened to find no existing disease after laying open a joint (the knee and the hip). Relief of symptoms followed, however, in each case.

Effusions.—Falcoz³⁶⁰_{Sept.} reports 16 cases of hydrarthrosis at the Hospital Tenon treated by puncture or punctures, followed by carbolic injections, 1 part to 20. Thirteen resulted in complete and permanent cure; 1 of the remaining 3 had an acute arthritis; 1 was treated with tincture of iodine; 1 was still under treatment.

Ten hydrarthroses were treated by simple puncture and 6 by puncture followed by antiseptic washings. One of these hydrarthroses was particularly interesting, inasmuch as the simple puncture brought no favorable result, but the patient was completely cured by puncture followed by injection of the joint.

The conclusion seems justifiable that the treatment by puncture and injection, inefficacious in cases of acute arthritis, always succeeds in chronic hydrarthrosis. Whether the hydrarthrosis originates under the influence of rheumatism or traumatism is of little importance; the essential factor is that there should be no acute inflammation in the joint, in order that, after having freed the articulation of its liquid (as of a foreign substance), the irritating properties of the carbolic-acid solution may prevent its reformation. The operation, without being in the least complicated, exacts very rigorous antiseptic precautions, neglect of which, in a hydrarthrosis treated by puncture and injection, could easily transform a simple chronic hydrarthrosis into a purulent arthritis.

Richardson⁹⁹_{May 16} cured 3 chronic cases by irrigations of 5-per-cent. carbolic solution. Cushing advised that the solution be made only one-half as strong.

Berne¹⁷_{Aug. 6} has found advantage in forcible percussion on or rupture of the sac in its upper and inner part, followed by massage.

Delbastaillé⁵²_{No. 11} has repeated on dogs the experiments of Henriett and Riedel by injecting the knee-joints with blood, and pro-

ducing, either immediately before or immediately after the injections, different lesions in the joints, such as fractures, contusions, penetrating wounds, etc. He came to the following conclusions: 1. Large quantities of blood placed in sound knee-joints are fully absorbed in three weeks, leaving behind, at the most, a little staining of the synovial membrane. The animals could run well from five to eight days after the injection. 2. If the injection closely precedes or follows the wound of the joint, the result is very different, according to the nature and extent of the lesion. In an incomplete, non-penetrating patellar fracture the absorption is delayed for about sixteen days. A similar delay occurs after bruising of a joint, and is still more marked after penetrating fractures, tearing of tendons, etc. The coagulum then undergoes all the changes of organization, and, as a result, there is limitation of motion and ankylosis. 3. The immobilization of a joint filled with blood retards the absorption. 4. If an aseptic foreign body, such as a piece of drainage-tube, is placed in the joint before it is injected, absorption occurs more quickly. He believes that the synovial irritation accounts for this. 5. If one adds to the blood injected into the joint some synovial fluid from the cow, this quickened absorption does not occur.

Intermittent Dropsy.—V. Brincken ⁴_{Aug. 12} reports a case of twelve-day period in a woman aged 25, and regards the affection as malarial, to be treated with quinine and arsenic.

Floating Cartilage.—Claudot ²⁴³_{Feb., Mar.} and Woodward ⁹⁹_{Apr. 25} have written upon this subject, the latter giving an analysis of 105 cases, collected and tabulated, in which antiseptic operations have been performed, with but 1 death. Jacobson ⁶_{Aug. 24} and Alexander ¹⁸⁷_{July} have reported cases of traumatic origin; in the first a piece of articular cartilage having been detached from the inner condyle of the femur by a fall upon the knee, and in the second a large body, cartilaginous and bony, was removed that had been separated from the external condyle in consequence of injury received a year before. Respecting the manner of formation of these bodies, Bell, ⁹⁶_{Feb} reporting a case of exostosis bursata, noticed in the last ANNUAL, in which he found 53 small cartilaginous bodies like floating cartilages, states: "This subject, however, has a most important bearing upon the explanation of the existence of floating cartilages, as they are called, which are so often found in the knee-joint and,

less frequently, in the elbow-joint. It appears to me that the most natural explanation of the existence of these bodies in joints is that offered by Fehleisen, whereby the cartilage-cells existing in the tufts of the synovial membrane develop into small cartilaginous bodies, which are set free and float loosely in the synovial fluid. The many explanations hitherto offered for the existence of those bodies, such as inflammatory processes, quiet necrosis of cartilage, etc., have entirely failed to offer a satisfactory solution of the question of their origin."

Removal of Internal Semi-lunar Cartilage.—Annandale ²_{Feb.} declares that no mechanical appliances will cure cases in which the semi-lunar cartilages are much separated from their attachments or otherwise seriously injured. Such appliances may, by limiting the movements of the knee-joint, allow a patient to walk more or less stiffly and to bear weight upon the limb as long as they are employed, but such a means of palliative treatment cannot be compared to the successful and permanent result obtained by a suitable operation. After such operation there was, in a patient of his, satisfactory recovery of the motions of the joint.

Rheumatoid Arthritis.—Better, "osteoarthritis" is, according to Spender, ²_{June 1}, early indicated by (1) increased velocity and tension of the heart's action, and here the inhibitory action of the vagus is at fault. 2. The disturbance in the chromatogenous function of the skin; the patches of bronzing and discoloration are peculiar, and have been generally overlooked. 3. Vasomotor disturbances, as indicated by the clamminess of the skin and trophic changes. 4. Specific neutral symptoms. Of these, "the earliest prophetic note of the coming storm" is pain in the muscles of the ball of the thumb or over the inner side of the wrist. The motorial symptoms include the peculiar muscular atrophy to which Ord has called attention. The disease often follows close upon a rheumatic pyrexia, which he thinks should be regarded as a forerunner. He has found much benefit from the systematic use of the Bath waters.

Syphilitic Arthritis.—Special attention is called, by Kirmisson, ¹⁴_{May 29}, to the fact that in these cases there is but slight functional disturbance of the joint, and that the prognosis is generally a favorable one.

In a case of muscular gumma which had penetrated the knee-

joint, Renaud, ²²⁰_{Sept.27} after removal, secured immediate union without any joint inflammation.

Syphilitic bursitis is, by Buechler, ¹⁵⁰_{Aug.} believed to be much more common than is supposed, and may be met with in connection with secondary or tertiary lesions.

Arthritis Deformans.—Two cases in children are reported by Schmitt, ⁵⁴_{Mar.15}. The diagnosis is based upon the existence of (1) symmetrical joint involvement, (2) early muscular atrophy, and (3) enlargement of joints. Heart complications are not uncommon. The prognosis is not entirely hopeless, and the cases should be treated by baths, massage, electricity, the iodides, salicylates, and tonics. An interesting paper on the "ossified man," by Stark, ¹_{Apr.20} has been published.

Tuberculosis of Tendon-Sheaths and Bursæ.—A good *résumé* of what has been determined is given by Wallich, ¹⁰⁰_{Sept.31} and a case is reported by Princeteau ¹⁸⁸_{Apr.7} in which scraping and opening of the wrist-joint and removal of the ends of the radius and ulna and the first row of the carpus were followed by recovery, with preservation of a considerable degree of movement. Fungous inflammation of the retrocalcaneal bursa in young children, a disease of infrequent occurrence, is, according to Tournier, ¹¹⁸_{Oct.} to be treated by free incision, curetting, and the application of iodoform. Clinical evidence of the tubercular nature of ganglia, containing melon-seed bodies, is afforded by a case of Schwartz's, ³⁵_{Apr.11} in which an operation upon the ganglion in the palm of the hand was followed by local return and, later, rapidly fatal tuberculosis of the lung. The patient was also the subject of tubercular disease of the testis and cord, for which castration was done at the time of the primary operation upon the ganglion. Reliquet, discussing Schwartz's paper, stated that rapid appearance of lung disease, after operations for local tuberculosis, was of such frequent occurrence that in cases of this sort, unaccompanied by suppuration, he advised against surgical interference, believing that one should be content with general treatment.

Among the rare cases reported, notice may be taken of one of myositis ossificans in a patient 56 years old, by Kronecker ⁴_{Apr.8}; one of bilateral post-hemiplegic arthritis, by Satterlee and Corning ¹_{Mar.16}; and one of universal suppurative arthritis in a 2-month-old foundling seen by Myers. ⁵⁹_{Mar.26}

PLASTIC SURGERY.

Ear.—For the relief of deformity from prominent ears, Keen¹⁰⁹⁹_{Sept.} removed a long, elliptical piece of skin from the posterior surface of the auricle, in the long axis of which a long, narrow piece was removed from the cartilage, V-shaped on cross-section. "Great care was taken not to cut through the skin on the anterior surface of the ear. On the left side three catgut stitches were introduced in the cartilage itself in addition to those in the skin. On the right side reliance was placed entirely on the sutures of the skin. The result was equally satisfactorily on the two sides. The two operations were done at the same time. They were attended with very free bleeding, which, however, was easily controlled."

Nose.—Czerwinski,³³⁶_{Feb. 23} for the relief of sunken-in "saddle nose" suggests: 1. Cut from the forehead in the ordinary way a long, oval flap. 2. Fold this upon itself in the middle transversely, so that the periosteal surfaces may be in contact, and then sew the edges together. 3. After waiting a sufficient time for the surfaces of the flap to unite, detach the cartilaginous portion of the nose, elevate it, freshen all edges, bring down the flaps and attach. There is, he thinks, but little danger of the flap shrinking much.

Check.—Ritschl,³⁴_{Apr. 9} advises operating in the following manner: A flap of the size of the defect is cut from the immediate vicinity, leaving a small isthmus of skin between the defect and the flap. The flap is then simply turned over into the defect, with its skin surface inward toward the cavity of the mouth. This leaves a large wound surface, the size of the original defect plus that of the flap. This surface is finally covered by grafts of skin removed from the arm by Thiersch's method. Little shrinking results and the cosmetic effect is good. The whole operation is performed at one sitting.

Mammilla.—Depressed and useless nipples have been operated upon by Axford,⁹⁶_{Apr.} who thus describes the method: An assistant, with a pair of vulsella forceps, seizes the nipple and drags it out to a length somewhat greater than natural; the operator, with a pair of curved scissors, beginning at a point about $\frac{1}{3}$ inch from the apex, excises a diamond-shaped piece of skin, extending out on the breast about $2\frac{1}{2}$ inches and about $\frac{1}{2}$ to $\frac{3}{4}$ inch broad at its centre. The fat is cleaned away down to the fascia, which protects the ducts

from injury. Three such areas of denudation are made. Beginning in the denuded area, a catgut suture is passed in and out through the fascia, purse-string fashion, emerging at the point of entrance and encircling the base of the newly-designed nipple. This is now tied snugly, and, if properly passed, will hold the nipple out well after the vulsella has been removed. The denuded areas are now covered (as is the catgut suture and its knot) by drawing the skin of the diamond-shaped incision together with silk. A dressing is now applied so as to keep the breasts as much at rest as possible, when union by first intention is usually found to have occurred. Treatment must not cease with the withdrawal of the sutures, but the nipples must be protected by a suitable shield.

Tendon Suturing.—Successful cases have been reported by Schwartz³_{Oct. 23} and Perier.¹⁴_{Nov. 3} Mayo Robson,²_{June 11} in a case of severe injury in which the dorsum of the hand was entirely divested of muscular and tendinous structures and the palm was extensively lacerated, took a piece of hanging tendon from the front of the hand, $4\frac{1}{2}$ inches in length, and stitched it by a single suture at each end to the extensor muscles and the remaining fragment of the extensor tendon. The wound was kept aseptic, and no sloughing took place. The man recovered good movement, and was able to return to his work as a weaver. The hand could be pronated and supinated, and he could move the thumb and index finger.

Spina Bifida.—Of 32 cases in the St. Petersburg Hospital, from 1871 to 1887, 30 died early and only 2 lived more than a year. Zenenko⁹¹_{Apr.} therefore urges interference, and reports a complete removal of the sac in a boy 14 years old, with resulting great improvement in locomotion and relief of incontinence of feces and urine.

Skin-Grafting.—In numerous papers in English, French, and German there are set forth the advantages of the various methods of grafting, with reports of cases in which epidermic grafts and small or large pieces of skin have been successfully implanted, among which may be noted those by Thomas,²⁴³_{Dec., '88} Franke,⁶⁹_{Jan. 12} Eiselsberg,⁸⁴_{Jan. 24} Hart,²_{Mar. 9} Husson,⁹⁶_{Apr.} and Heydenreich.³_{June 12} Kraske,³⁴_{Jan. 1} in a case of cancer of the breast which could not be taken away, by the use of numerous skin-grafts from the arm effected closure of the existing ulcer, and thus afforded temporary relief of the most troublesome symptoms.

Wolf's method, according to v. Esmarch,⁶_{June 8} who reports 13 cases, enables us at once and completely to cover fresh wounds. We can replace skin with cicatricial tissue by true skin, which offers greater resistance to external deleterious effects. It gives better cosmetic results than any other method of transplantation, and this is specially important in operations on the face. The only disadvantage which this method has is that the flap is liable to subsequent shrinking, but this can be obviated by making it larger than is necessary, so as to provide for the shrinkage. It is peculiarly applicable to plastic operations, and in cases in which we have to deal with large wounded surfaces in the face incapable of being closed with sutures. In such cases it is to be preferred to any other method.

Fowler,⁹⁶_{Mar.} in treating an extensive burn of both buttocks, successfully employed large strips of skin, human and frog. Six months after the transplantation it was found that the frog-skin was soft and pliable, and of a reddish hue. The white human skin was firm and of a darker color than the above, but much lighter than the rest of the patient's body. The portion of skin transplanted from the patient's arm was nearly as dark as the natural color of the patient. The color of the small patches, the result of cicatrization, was decidedly that of the negro, as was also that of the cicatrized surfaces about the ankles. There was not the slightest tendency to contraction of the surfaces of repair. In the paper are given detailed instructions for preparing the ulcerated surfaces for the operation and for the removal of the skin to be employed, as well as for the subsequent dressings.

Senger,⁴_{Aug. 19} discussing the treatment of lupus (which he thinks should be by removal of the entire thickness of the diseased skin, the resulting gap, if large, being filled in by transplantation), says of Thiersch's method that the transplantation can be put into a fresh wound, and it is therefore not necessary to wait until granulation has occurred. It is neither necessary nor best to cut the sections so that they will exactly fit the wound, but rather to have them overlap its edges, and, if several pieces are laid on, to let them overlap each other.

Silbernik⁹⁶_{Aug.} holds that, in neglected large and deep ulcers of the leg, the best treatment consists in transplanting large strips of skin from the patient's own person, lateral flaps from the neigh-

borhood of the ulcer being preferred, provided that the ulcer is situated longitudinally and the integuments in its vicinity healthy.

Rivington²_{May 4} applied large flaps from the side of the chest to the elbow for the relief of cicatricial contraction.

Croft⁶_{May 18} advocates the use of large flaps of skin, and their transplantation in two stages or at two separate operations. At the first stage of this operation the strap or bridge of skin, varying in length from 5 to 6 inches, is to be raised, left attached at each end, and carefully dressed. At the second stage, when the strap to be transplanted is in a suitable condition, and when the patient is in a condition to bear the operation, the connections are to be severed and the transplant moved to the position which it is permanently to occupy. The advantages claimed for this mode of operation are: 1. That risks of sloughing of the parts of the transplant are greatly diminished, the transplantation being made two or three weeks after the first operation. 2. That, instead of being transplanted when recently drained of blood and reduced in temperature, the transplant is moved when abundantly vascular and full of active living plastic material. 3. That this plan has manifest advantages over that of transplanting a flap from a distant part of the body. 4. That by this mode large flaps of skin may be transplanted, provided that this simple rule be observed: that the length of the strap when cut shall not be more than three times the width of the base.

Zooplasmic grafts, taken chiefly from the chicken or the frog, are being numerously experimented with. Rogers²³¹_{Dec., '88} had a good result following the application of chicken-skin, and Altamirano, of Mexico,⁶⁷³_{Oct.} successfully grafted at one time upon an ulcer 6 by 8 inches twenty pieces of cock's wattle, about $\frac{1}{8}$ inch square. At a meeting of the Paris Société de Médecine Pratique, Dubousquet-Laborderie¹_{Mar. 16} showed a young man whom he had treated by grafting a portion of a frog's skin on an open wound of the foot, resulting from an abscess. The member presented a most natural appearance, and the operation seemed to have been a complete success. The surgeon stated that he had treated 19 persons in this way and 1 with chicken-skin, and in 7 of the cases he had had complete success; they were cases of loss of substance after burns, ulcers, etc. He had used the frog in preference, as its skin had no follicles and was extremely vascular. His success with

the method had led him to hope that zooplastic grafting would become of great practical utility, so that there would be no longer any danger of inoculation of syphilis or tuberculosis through open wounds, which certainly had happened. He, however, admitted that the operation would sometimes fail, though conducted with the greatest care and attention. Polaillon said that one reason why such operations did not succeed was that the frog's skin was anything but aseptic, and not only should the precaution be taken of cleaning the frogs, but they should swim for some time in a solution of boric acid before the skin was used. Very often grafted skin was re-absorbed, but even then it favored cicatrization; and, while it was not the frog's skin that remained on the patient, still it had acted by its presence and been the point of departure of a cicatricial proliferation. Danet remarked that, while the skin was not the same in different parts of the body, it did not matter which part was used, as the result would be good; and the first speaker closed the discussion by saying that he had once restored an eyelid with skin taken from the scrotum. Dubousquet-Laborderie,²⁴_{May 5} regarding frog-grafts as only points of departure of autoplasmic restorations, stated that they were generally replaced by the patient's own epidermis by the sixth day, having but once seen them remain to the twelfth day.

FRACTURES AND DISLOCATIONS.

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FRACTURES.

Fractures of the Spine.—A number of cases have been reported during the year in which an attempt has been made, by a cutting operation, to relieve the paralysis following fracture of the spine. J. E. Mears⁹_{Dec. 22, '88} reports 1 case; John Duncan³⁶_{Mar.} reports 3; H. Allingham²_{Apr. 13} reports 2; and Dawbarn¹_{June 29} 1. The operations consisted in cutting down upon and removing the spinous processes and laminae, usually of several vertebrae, dorsal or dorso-lumbar. The least amount of bone removed was in Mears's case, one lamina and articulating process of the first lumbar vertebra; the most, the spinous processes and laminae of the third to sixth dorsal vertebrae, in one of Allingham's. In all except two cases the fracture was comparatively recent; in those two (Dandridge and Dawbarn) several months had elapsed since the injury. One patient (Duncan) died on the day following the operation; all the others recovered. The results, as regards relief of the symptoms for which the operations were undertaken, were practically negative; in Dawbarn's there was some amelioration.

In the lack of sufficient clinical gains to justify so serious an operation, it may well be doubted if the argument that, as no (!) harm can come from it, it should always be undertaken, will lead to generalization of the practice. A capital point, which seems to have been overlooked by some of the operators, is, that injury of the cord in fracture, when due to pressure of the displaced bone, is caused much more by the body of the vertebra than by the lamina, and that consequently the removal of the latter does not remove the cause. And, on the other hand, this cause can frequently be removed, as is proved by many cases, by manipulation without a cutting operation, including in that term modified suspension, and by immobilization in plaster-of-Paris jacket. The
(H-1)

alleged innocuousness of antiseptic surgery is already responsible for much officious interference and many deaths, and, if ill results were published as often and as promptly as the good ones, the actual risks in a resort to the knife would, perhaps, be better appreciated.

Dandridge accompanies the report of his case with a thoughtful and eminently judicious discussion of the propriety of interference, and is disposed to limit it to old cases. He reports 3 recent cases treated by hammock-suspension and plaster of Paris, with complete recovery in 2 and partial recovery in 1, and 1 case 5 months old similarly treated with marked benefit.

Fractures of the Ribs.—James Cantlie²_{Mar. 9} reports a case of fracture of the *twelfth* rib on the left side, occasioned by a fall from bed, the patient's side striking a stone-ware spittoon with such force as to break it. The twelfth rib was broken 2 inches behind its tip, and the distal fragment was freely movable, with crepitus. He also reports a case in which both twelfth ribs were broken by "a fall backward on to the edge of a plank, about 2 feet from the ground. The plank caught the patient across the loins, or, rather, exactly on the twelfth ribs. The signs and symptoms coincided almost exactly with the fracture recorded in Case I." F. A. Neal²_{Mar. 23} reports two additional cases; in one the eleventh rib also was broken. H. M. Barth¹⁵²_{Dec. 18, '88} reports a case of death by hæmorrhage into the pleural cavity on the ninth day after a fracture of the sixth rib in the right side. Until a short time before death the patient was apparently doing well, and there were no symptoms of hæmorrhage. The autopsy showed a hæmorrhage into the pleural cavity estimated at 3 litres (3 quarts), evidently furnished by the ruptured intercostal artery. It was thought that the artery had been injured at the time of the accident; that the primary bleeding had been spontaneously averted by clotting, and the clot had subsequently been detached by coughing. Bird²⁸⁵_{May 16} reports a case of fracture of the *second* rib 1½ inches (4 centimetres) from the anterior end, by muscular action in an attempt to lift a heavy chest.

Ununited Fracture of the Radius Successfully Treated by Bone Grafts.—McGill⁶_{Oct. 20} reports a case of old ununited fracture of the radius in a lad of 20 years. The original fracture was of both bones, and compound on the radial side; the ulna united; three

months later the radius was cut down upon and wired, unsuccessfully. A year after the original injury he came under McGill's care. He cut down upon the fracture, which was at the junction of the middle and lower thirds, removed the tough cicatricial tissue that united the two rounded ends, freshened the latter with a file, and placed in the gap between them, which was $\frac{3}{4}$ of an inch (2 centimetres) long, thirteen minute pieces of bone chiseled from the femur of a freshly-killed rabbit. The incision was closed with catgut sutures without drainage, and the limb dressed, under firm pressure, with salicylic wool. An Esmarch bandage had been applied before making the incision, and was not removed until after the dressing was completed. Five weeks later there was firm union. Four months later the patient was shown at the meeting of the British Medical Association, the limb being then as useful as its fellow.

Fracture of the Neck of the Femur.—Senn⁶¹_{Aug.5} strongly recommends the treatment of fracture of the neck of the femur by a plaster-of-Paris dressing, enveloping both lower limbs and the lower part of the trunk, together with direct pressure against the outer aspect of the great trochanter, in the line of the long axis of the neck of the femur, by means of a pad moved by a screw through an iron bracket set in the plaster. The plaster is applied with the patient upright, standing on a chair on the sound leg, so that the weight of the broken limb may make the necessary extension. He reports 8 cases thus treated during the last five years, with good results. The treatment is "contra-indicated in cases of extreme obesity and debility, and in patients suffering from concomitant diseases, which, in themselves, would lead to a fatal termination."

Fracture of the Patella.—The interest in the treatment of this fracture, which has been so marked of late, has continued during the past year, the record of which is specially noticeable on account of the number of cases reported, and methods employed to obviate resort to open arthrotomy with wiring of the fragments.

H. O. Thomas²⁶_{Aug.1} calls attention again to his method, by indirect fixation of the knee, which he first published in 1882, and quotes a number of cases to show the efficiency of the method, and the usual absence of any confinement to the bed or house.

He says that fracture of the patella is, of all important fractures, "the easiest to restore and repair, and least cripples the patient during treatment." In support of this striking statement he gives the histories of 11 cases, in all of which the patients recovered with close union of the fragments, and in most of which they went about immediately after the application of the splint. This splint is the one used by Thomas for fixation of the knee in disease; two metal rods lying along the sides of the limb, attached to the heel of the shoe, and fitted with a perineal band and three straps, one of which passes behind the knee, the others across the front of the thigh and leg respectively. He keeps the knee uninterruptedly fixed for four or five months.

Massing²¹_{June 10} reports 4 successive cases treated by fixation of the upper fragment by means of a strip of rubber buckled around the thigh close above the upper fragment, and drawn downward by bands attached to the lower end of a posterior splint. At the end of the treatment there was no recognizable mobility of the fragments upon each other.

Ceci¹⁴_{Apr. 24} reports 11 cases treated by him by subcutaneous wiring, in the manner described last year: In 10 the fracture was transverse, in 1 comminuted; all recovered. In 1 refracture occurred through too early use of the limb.

Myles¹⁶_{Nov.; Mar. 16} reports several cases treated by drilling each fragment transversely, passing a stout pin through each, the ends projecting through the skin on each side, drawing the fragments together by pressure on the pins, and fastening the pins together by a ligature or wire; the points of puncture are protected by an antiseptic dressing and the pins removed at the end of a month.

Mayo Robson²_{Mar. 30} reports 2 cases in which he similarly passed pins transversely, one "through the aponeurosis above the upper fragment," the other through the ligamentum patellæ, and tied them together.

A more extended experience is needed to determine the measure of risk in these various operative methods, for, I think, it can fairly be held that the functional results obtained by non-operative methods are, on the whole, so good that a resort to operative methods that are accompanied by a decided risk, either to the integrity of the joint or to the life of the patient, is not justifiable. I reported to the New York Surgical Society¹_{Aug. 10} 14 cases

treated by the subcutaneous silk suture. The number of cases treated by me within the last year is 24; all did well, and recovered with close union of the fragments except 2, in whom suppuration of the joint with subsequent ankylosis ensued. If that proportion of failures should be maintained, I should have no hesitation in condemning the method, and yet I believe it to be as safe as any of the other operative methods employed. In one of the 2 cases suppuration did not begin until nearly a fortnight after the operation, the patient having been discharged from the hospital with the limb in a plaster-of-Paris dressing.

Landsberg³³⁶_{Sept. 28} reports a case of *avulsion of the tuberosity of the tibia* in a lad 16 years old by muscular effort in jumping. The patella was displaced upward about 10 centimetres (4 inches), and at about the same distance below it could be felt a small, movable piece of bone; an erroneous diagnosis of fracture of the patella was made, and, because of the supposed wide separation of the fragments, it was determined to wire them. A transverse incision was made, and then the actual condition was recognized. A longitudinal incision was carried downward from the centre of the first, and the tuberosity was fastened in place by a nail; this was removed at the end of a fortnight. Complete recovery followed.

Marchant¹⁵²_{Feb. 21} reports a case of *paralysis* of the region supplied by the *external popliteal nerve*, through compression of the nerve by an exuberant callus formed after fracture of the upper end of the fibula. Six months after the injury Marchant operated; he found the nerve lying upon, but not included in, the callus, flattened and changed in color; the callus was chiseled away. A year later improvement began, and in the course of a few months recovery was complete.

Fracture of the Posterior Lip of the Astragalus.—Broca⁷_{Dec. 28, '88} showed a specimen of this injury obtained, without history, in the dead-house. The posterior portion of the bone was separated by a transverse line of fracture, but not displaced; the injury was an old one, and union had not taken place.

DISLOCATIONS.

Walton⁹⁹_{Mar. 21} reports 5 cases of *dislocation of the cervical vertebrae*, some of which are of exceptional interest. In 3 the lesion was situated at about the middle of the cervical spine,

and the patients all recovered without special treatment; that is, there was no persistent paralysis, and the general health and ability to go about were normal, but there was some limitation of the movements of the head and neck. In 1 case the patient remained completely disabled, with paralysis of motion and sensation, for fifteen months, and then, apparently through the effect of ice-cold douches upon the back, he began to improve, and in a month was able to go to work. Three years after the accident the only trace of the injury was that "the head was held rather stiffly, canted slightly to the left, with the chin elevated and turned to the right, the whole head being held somewhat forward." In the fifth case, supposed to be a unilateral dislocation of the atlas upon the axis, the patient recovered without especial treatment, except for some deviation of the head and rigidity of the neck. A detailed account is given of the symptoms, including some indicating injury to the cranial nerves, supposed to be due to an effusion in the region of the medulla pressing on the nerve-roots.

Laplace ⁷⁶⁰_{Oct. 19} reports a case of lateral dislocation of the fourth cervical vertebra, treated two months after the accident by incision down to the laminæ, and reduction by forcible bending of the head and manipulation. Recovery was complete in three months.

Bradley ⁵⁹_{Aug. 24} reports a case of *costo-chondral dislocation of the first to sixth ribs* on the right side, the ribs being displaced backward and inward. The patient, a man 26 years old, was caught between a wall and a passing railway-car. There was also subluxation of the sternal end of the right clavicle. Reduction failed. There was at first considerable dyspnoea and a profuse frothy expectoration. Complete recovery followed, with persistence of the displacement.

Stoner ¹⁸⁵_{Oct.} reports a case of *dislocation forward of the cartilages of the fifth, sixth, and seventh ribs upon the sternum*. The patient, a man 32 years old, had been caught between a barge and a wall. Recovery.

Shoulder; Backward Dislocations; Subspinous and Subacromial.—Several cases of these rare forms have been reported during the year.

Moore ⁵⁹_{Apr. 6}: The patient, a man 43 years old, presented himself with a subspinous dislocation of five months' standing. "The head of the humerus could be felt distinctly on the dorsum of the

scapula beneath the spinous process." It was reduced under chloroform, after breaking up very firm adhesions, by traction upon the arm forward and outward. It recurred on the following day, and three days later chloroform was again administered, and the upper end of the humerus drawn forcibly forward; tearing was felt, as if more adhesions were being broken, and the bone, aided by strips of adhesive plaster, thenceforth remained in place. Five days later Moore was summoned in haste to his patient, and found that he had produced a similar dislocation of the opposite shoulder during repeated epileptic attacks that morning, while in bed, and not under forcible restraint. The brother, who was present on both occasions, stated that the former dislocation had been produced under similar circumstances. The second one "was easily reduced by manipulation."

Cates¹⁹_{Jan. 10}: A woman 58 years old was thrown from a wagon, striking on the right elbow and right shoulder. The head of the humerus could be felt beneath the spinous process of the right scapula. Reduction by traction upon the arm and pressure from behind.

Andain¹⁶⁴_{July 25}: A man aged 59 years fell unconscious, and was with great difficulty taken by friends to his room, up a narrow staircase; and the dislocation appears to have been produced, not by the fall, but by pressure upon the arm during the efforts made to get him upstairs. While one friend pulled him from above, another held him by the right arm and pushed him upward, the patient lying on his back. When admitted to the hospital, a month later, the head of the humerus could be readily recognized "to the inner side of the root of the acromion, below the spine of the scapula." The disability was slight, the patient could make all movements with ease and without pain, elevation of the arm being restricted. Reduction by traction.

Dolard²¹¹_{May 12} gives a minute description of the physical and functional condition of a man 68 years old, with a *subacromial dislocation* of 29 months' duration. The scapula being solidly fixed, the arm could be carried forward 30 degrees, backward 10 degrees, and abducted 15 degrees to 20 degrees; adduction normal; active rotation almost entirely lost. With the scapula free the range of motion was almost normal. The patient declined treatment.

Baum³³⁶_{Jan.26} says that he had seen only three backward dislocations in the course of his practice. The third had just come under observation. He does not state whether they were subacromial or subspinous, and does not give any description of them. The sole object of his note is to call attention to the ease with which they were reduced by abduction of the arm and inward rotation or pressure upon the head from behind without anæsthesia.

Beach⁹⁹_{Oct.24} briefly reports a case as "subspinous," easily reduced "by flexing the arm and rotating the head of the bone into the axilla, then extending the arm and applying moderate pressure with the hand in the axilla." The term subspinous is often used to include both forms, and there is some reason to think this may have been the subacromial variety. It is not easy to understand how the head of the humerus could have been thrown into the axilla in the course of reduction.

Anterior Dislocation with Fracture Through the Anatomical Neck of the Humerus; Excision of the Head; Recovery.—Manc⁷_{Oct.} : A man 37 years old fell from a bicycle, striking upon the right hand and elbow. When admitted to the hospital the arm was abducted, its axis directed toward the subclavicular fossa, and the head of the humerus could be felt in the axilla. The region was greatly swollen. On attempting to make reduction, crepitus was perceived, and it was then noticed that the elbow could be easily brought to the side of the body, and the diagnosis of fracture, probably of the anatomical neck, was added to that of dislocation. Three days later reduction was attempted under chloroform by traction upon the arm and pressure upon the head, but in vain. A week after the accident an incision was made in the axilla, as for ligature of the axillary artery, and the detached head was removed. The line of fracture ran exactly along the anatomical neck; the capsule was extensively torn, and its cavity filled with blood. The patient made an uneventful recovery, and two months later had good use of the limb.

Treatment of Old Dislocations.—Knapp,⁷⁶¹_{v. 4, p.372; Apr.15}¹³ reviews reported cases of operative reduction of shoulder dislocations, and two of his own, and comes to the conclusion that, except in recent cases, resection of the head of the humerus is to be preferred. His two cases are as follow: 1. Patient 43 years old; axillary dislocation, 3½ months; glenoid cavity filled with fibrous tissue;

removal of a mass of callus as large as a hen's egg, including the fractured greater tuberosity; head restored to glenoid fossa with great difficulty. The wound suppurated. Subsequently the head of the humerus was excised. Patient dismissed in 3 weeks with moderate mobility. 2. Patient 56 years old; dislocation, 2 years; a united fracture of the surgical neck was found; removal of a large mass of callus, including the fractured greater tuberosity; reduction. Healed after suppuration, with moderate mobility and persistence of a sinus, through which loose bone could be felt. The cicatrix was subsequently reopened, and it was found that of the head of the humerus only four or five necrotic fragments remained; these were removed, and the cavity scraped.

McLaren³⁶_{July} reports a case under the care of Heron Watson. The patient was 40 years old, the dislocation subcoracoid, received during sleep, probably in an epileptic attack, and was not recognized until a month later. The joint was reached through an incision in the interval between the deltoid and pectoralis major; the two upper facets of the greater tuberosity had been broken off. The head was returned to the socket with some difficulty. Wound healed without suppuration. Eight months later there was good use of the limb, but very little power of external rotation.

Jonas¹⁶⁶_{July} operated upon a young man eight weeks after the dislocation (subcoracoid) had taken place; the shaft of the humerus had been broken at the same time at the junction of the upper and middle thirds; the fracture had united. A first incision was made "from the upper border of the glenoid cavity downward, almost to the insertion of the deltoid," and through this the contracted capsule was excised. (I understand by this that the outer part of the capsule was dissected away from the glenoid fossa.) A second incision was made "almost directly over the head of the bone, cutting the pectoralis major, and the bone restored to its place. Primary union of the wounds." It is proposed to seek to increase the range of motion by division of adhesions between the humerus and the glenoid fossa.

T. G. Morton⁹_{Aug. 3} operated upon a subcoracoid dislocation $3\frac{1}{2}$ months old in a man of 24 years. He made "a vertical incision through the deltoid down to the head, and found it so firmly attached in the abnormal position that it was not possible, without the greatest risk, to attempt to dislodge it. He then carried a

chain-saw around the bone at the anatomical neck, and sectioned the shaft obliquely from below upward, and then readily placed the divided end in the glenoid cavity." The wound healed promptly, and the prospect of having a useful limb was good.

Dislocation of the Ulna Forward.—J. S. Wight¹⁵⁷_{Sept} reports a case of this rare injury, and one differing from the other reported cases of forward dislocation of the elbow in that the ulna alone was displaced, the radius retaining its relations with the humerus. This singular condition was apparently produced by marked abduction of the forearm, turning on the head of the radius as a centre, by which the olecranon was carried below the trochlea to a position in front of it. It was caused by a fall upon the elbow, and was favored by the small size of the trochlea. It was reduced by abduction of the forearm, followed by pronation, flexion of the elbow, and pressure backward upon the upper end of the elbow. The patient recovered with some limitation of motion.

Subluxation of the Head of the Radius.—Van Arsdale⁹⁶_{June} furnishes an interesting article upon this much-disputed injury, which is again receiving considerable attention from surgeons. A striking feature in recent papers and discoveries has been the ignorance of the writers of what was already to be found in text-books and papers upon the subject, and Van Arsdale's thorough review of the literature of the subject may be expected to save us from further rediscoveries of old facts and theories. In addition to his review of the literature of the subject, he brings the clinical knowledge obtained by observation of 100 cases. Unfortunately he feels forced to conclude that "the anatomical lesion causing the injury is not yet satisfactorily established," but he suggests that it may be a partial fracture of the neck, or separation of the upper epiphysis of the radius.

Double Congenital Dislocation Backward of the Head of the Radius.—Clay²_{May 18} reports 2 cases of this lesion in adult males (twins) of weak intellect. The father was similarly affected. The forearms were pronated, and could be only slightly supinated. Extension was almost complete.

Dislocations of the Carpus.—Sherburn⁶_{May 18} reports a case of dislocation of the *carpus backward and to the radial side* in a boy 14 years old, caused by a fall from a height. There was no fracture. Reduction was affected by hyperextension of the wrist,

traction while gradually flexing, and pressure upon the projecting carpus.

Carroll²¹³_{Feb.} reports a unique case of *dislocation of the carpus to the radial side* in a man 29 years old, caused by a fall. Reduction was easily made under chloroform.

Moriarty²_{Apr. 22} saw a case of *forward dislocation of the carpus* in a boy aged 15 years, caused by a blow on the palm. "The hand was extended and immobile, with an elevation on the posterior aspect (of the wrist), due to the ends of the radius and ulna, and a corresponding prominence in front due to the carpus. No fracture. Reduction."

Fourth Metacarpal Bone.—Taylor¹¹²_{June} saw a case of backward dislocation of the proximal end of this bone, caused by striking with the closed fist. Easily reduced by direct pressure.

Dorsal Dislocation of the Proximal Phalanx of a Finger.—Stimson¹_{Mar. 30} reports a case in which, after failure to reduce by manipulation and traction, he succeeded by a longitudinal incision on the palmar aspect, through which the anterior or glenoid ligament, which was tightly drawn across the dorsal surface of the metacarpal bone, was nicked at its centre, and then lifted back over the head with a tenaculum.

Battle⁶_{Dec. 22, '88; 96, Apr.} writes at considerable length upon the subject. He recommends that the glenoid ligament should be divided by introducing a strong tenotome on the dorsum, and to the outer side of the extensor tendon, about a quarter of an inch behind (above) the articular surface of the phalanx. "Pass it onward to the head of the metacarpal bone, and withdraw, pressing it firmly against the bone, for the ligament is dense."

Dislocation of the Distal Phalanges.—Pratt¹⁶_{Jan.} reports a *lateral dislocation of the ungual phalanx of the thumb* to the inner side, caused, in a man of 40 years, by a fall upon the end of the thumb. It was reduced by making lateral flexion to 90 degrees, and then traction in the axis of the thumb. The case is almost unique.

Gazin²⁴³_{Sept.} reports two rare injuries: *Forward dislocation of the middle phalanx* of the right ring-finger, and *lateral dislocation of the middle phalanx* of the right middle finger to the inner side. The former was caused by a sudden pull upon a strap held in the hand; the latter by a fall, and in this one the distal portion of

the finger was flexed laterally 90 degrees, so that it crossed the adjoining ring-finger.

Dislocations of the Hip.—The specimens of recent dislocations of the hip are still so few that additions to the number deserve mention. Two have been made this year. Rutherford²¹³_{May} obtained one from a man 66 years old, who had been knocked down on the railway by a passing engine; dorsal dislocation; reduction easy; death in 48 hours. The rent in the capsule “extended through the whole of its posterior half; beginning close to the posterior edge of the cotyloid ligament, at the level of the upper margin of the ischial spine, it runs downward and outward for about an inch ($2\frac{1}{2}$ centimetres). then forward, upward, and outward along the digital fossa, terminating at the superior (trochanteric) limb of the ilio-femoral ligament, which is intact. The round ligament is torn close to the head of the femur. A splinter, nearly half an inch ($1\frac{1}{4}$ centimetres) in diameter, has been separated from the head of the femur, from the inferior margin of its articular margin and slightly posterior to its median plane. Slight, but palpable, crushing of the bony margin of the acetabulum at a point opposite the root of the ischial spine.” Pyriformis, obturator internus, and gemelli torn across. Even after dissection the head of the femur could not be displaced into the sciatic notch nor as high as its upper border.

Stimson¹_{Aug. 3, 10} presented a specimen obtained from a man 56 years old, who died ten days after having received a dorsal dislocation of the right hip by a fall down a hatchway; it had been easily reduced. “The rent in the capsule was situated in its posterior portion, close to the labrum cartilagineum, beginning at the cotyloid notch and running upward 2 inches (5 centimetres). From its upper part a prolongation ran parallel to the axis of the neck, in close relations with the tendon of the obturator internus. The labrum was detached, but not separated, from the margin of the acetabulum for $1\frac{1}{4}$ inches (3 centimetres) in its posterior part, beginning at the notch. A piece of bone of new formation, which was attached to the outer surface of this part of the labrum, and in close relations with, but not a growth from, the margin of the acetabulum, 1 inch ($2\frac{1}{2}$ centimetres) long, and from $\frac{1}{4}$ to $\frac{1}{2}$ inch wide, had been pushed back and its upper end broken off. Ligam. teres completely divided. On the anterior surface of

the head of the femur was a groove or contusion parallel with, and close to the edge of, the articular cartilage, 1 inch (25 millimetres) long, $\frac{1}{2}$ inch (12 millimetres) wide, $\frac{1}{8}$ inch (3 millimetres) deep, along which the cancellous structure of the bone was exposed. When the dislocation was reproduced, this groove rested on the piece of new bone above described, and had evidently been caused by pressure against it. The ilio-femoral ligament and the anterior portion of the capsule were untorn.

Cases of *thyroid dislocation* have been reported by Liber, ²²⁰ May 31 Lange, ¹ Feb. 16 Rivington, ⁶ May 28 and Stimson ¹ Aug. 3 (2 cases). Lange's patient was 17 months old, who, when 6 weeks old, had "pneumonia and convulsions," after which her left leg was found to be rotated outward and abducted, and was apparently longer than the right. Flexion was possible up to 160 degrees. The leg could be rotated outward until the sole of the foot could be placed in the axilla. Every movement was possible except adduction.

The other patients were adult males; in all the dislocation had been produced by violent abduction of the thigh with pressure on the back of the hips, and in all the limb was held in wide abduction. All were easily reduced under anaesthesia by flexion, adduction, and inward rotation.

An *ilio-pubic dislocation* is reported by Pye-Smith, ²² Mar. 13 The patient was a woman 61 years old, who said she had fallen backward in going upstairs. "The head of the femur was easily felt, resting apparently on the ilium between the anterior inferior spinous process and the ilio-pectineal eminence, and beneath the iliacus muscle." Half-inch ($1\frac{1}{4}$ centimetres) shortening. Reduced under ether by traction in the axis of the slightly-flexed limb, combined with pressure on the head of the femur.

Another case, *complicated by fracture of the shaft of the femur*, is reported by Kammerer, ¹ Feb. 16 and made the text of a careful study of reported cases of dislocation of the hip complicated by fracture.

Cases of *dorsal dislocation in children* between 7 and 8 years old are reported by Farrant, ⁶ Oct. 12 Lyne Dixon, ⁶ Nov. 2 and Kennedy Douglas. Reduction was effected in all.

An *old dorsal dislocation*, 103 days, was treated by Bloch, of Copenhagen, ⁶⁷³ Sept. by excision of the head of the femur, which was found almost entirely separated from the neck by a large fissure, and only connected with it by a small bridge of bone. The

acetabulum was filled with fibrous tissue. Nine months later the patient had excellent use of the limb.

Congenital Dislocations of the Knee.—At a meeting of the New York Academy of Medicine¹_{Mar. 2} 6 cases of congenital dislocation of the tibia forward upon the femur, with marked hyperextension of the leg, were reported; in 3 cases both knees were affected, and in 2 the hyperextension was so great that the feet touched the front of the abdomen. Another case is reported by Joachimsthal,⁴_{Oct. 21} involving the right knee.

DISEASES AND INJURIES OF ARTERIES AND VEINS.

By JOHN H. PACKARD, A.M, M.D.,

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ALTHOUGH the literature of this subject has been somewhat largely increased during the past year, the additions to it have been, for the most part, in the way of records of clinical experience. Some interesting discussion of existing views, especially in regard to methods of treatment, must be noted.

The important and exhaustive essay of Delbet,⁹¹ *"Du Traitement des Anévrysmes Externes,"* mentioned last year, has been completed. After giving a full description of the various methods hitherto employed, the author discusses the applicability of each to aneurisms of special regions. This paper, which cannot be analyzed in the space here available, will, no doubt, be accorded a place among surgical classics.

Thoma⁶⁹ Apr. 18 to May 9 presents a *résumé* of the present status of opinion in regard to the etiology of aneurisms. He says that aneurism may be a mere dilatation of the wall of an artery or may be due to rupture of one or more of its coats, these forms being often combined. Six chief forms are observable:—

- | | | |
|-----------------------------------|---|---|
| Congenital, | { | Affecting the umbilical arteries, or the aorta at |
| Infantile, | | the ductus arteriosus. |
| Arterio-sclerotic, . . . | { | Of which there are five varieties: (a) diffuse; |
| | | (b) single spindle-shaped; (c) multiple spindle-shaped; (d) sacciform; (e) tent-like. |
| Embolie. | | |
| From arrosion (outside pressure). | | |
| Traumatic. | | |

We cannot enter upon an analysis of this article, but would note that the author speaks strongly against the idea that the occurrence of an embolus is an event tending toward the cure of an aneurism. Bramwell,⁷⁶⁶ July 26 of London, collaborator, publishes some tracings taken from cases of aneurism of the thoracic aorta, in which the characters of cardiographic and sphygmographic tracings

are seen. He suggests that, by carefully observing the exact characters of the tracings from a large number of such cases, data might be obtained whereby we might learn to judge in this way of the peculiarities of an aneurismal sac, the size of the opening leading into it from the aorta, etc. Klotz²¹³_{Oct.} describes a form of syphilitic arteritis obliterans affecting two or three fingers only of each hand with coldness and mottled lividity; the condition yields to antisymphilitic treatment. Kaufmann²⁰_{June 1} reports 2 cases of embolism of the superior mesenteric artery. Another case of this rare affection is recorded by Altmann.²⁰_{July 1} Zahn²⁰_{July 1} discusses the development of metastatic tumors by means of capillary emboli, with 3 very fully detailed illustrative cases. Meacham⁷⁶⁰_{May 4} records an instance of embolism of the left popliteal artery in a young man aged 19, the subject of rheumatic heart trouble; he recovered with the loss of the toes, which had become gangrenous. Rosenheim⁶⁹_{Apr. 11} has detailed the history of a man, aged 48, who had embolism of the left radial artery, which had been preceded by severe gastric pain (heftigen magenschmerzen), but the source of the embolus could not be determined. There was no evidence of any disease of the heart or arterial system. Another case in a man aged 28, the subject of aortic insufficiency, is reported²²_{May 3} to have occurred to Terrier; the brachial artery was occluded just above its bifurcation, probably by an embolus. Esmarch's bandage was applied to the arm above, the artery was tied, and the sac opened and emptied; artery-forceps were put upon the vessel below and the wound packed with iodoform wool.

Several cases are recorded²²⁴_{Dec. 22, '83} of errors in diagnosis. In 1 an abscess of the neck was supposed to be an aneurism, in 2 aneurism of the aorta was thought to be an abscess, and in 1 the extraordinary statement is made that this lesion was mistaken for a hæmorrhoid and lanced with fatal effect. Femoral aneurisms were twice mistaken for abscesses and opened, and in another instance one was aspirated with the idea that it was a sarcoma (?). In a leading article on this subject⁶_{June 29} several interesting cases are referred to and commented upon.

With regard to the treatment of thoracic and abdominal aneurisms in general, Litten²_{May 25} is reported to have made, at the Berlin Medical Society, some remarks on the inefficiency of the medical measures, and the uncertainty and risk of the surgical

procedures usually adopted, which called forth a protest from Senator, Ewald, and Heidenhain against such "therapeutic nihilism."

Philippe⁷³_{June 29, July 6} discusses the treatment of aneurisms by the introduction of foreign bodies. He says that acupuncture does not seem to have afforded a single success, death or amputation having ensued in every instance but one, and in that one the cure was finally effected by compression of the iliac artery, the femoral having been the seat of the lesion. From experiments on dogs, as well as on the cadaver, Philippe thinks we may conclude that all substances, if antiseptic, are well borne; that the object should be not to fill the sac up, but to retard the blood-current; that, of metallic threads, copper and silver are preferable; that horse-hair may cause emboli, and does not go into spirals, which would retard the blood-current; that laminaria tents may prove useful. In the case, for example, of an aortic aneurism, the laminaria tent, with a fine silver wire engaged in its canal, is introduced through a boutonnière made in the femoral artery; this opening is then sewed up with horse-hair and a round needle, after which the wound in the skin is sutured and dressed, the whole procedure being done antiseptically. The advantages claimed for this method, which is applicable rather when the lesion occupies the axis of the vessel, are that the entry is effected at a sound point and that the blood-current is only gradually slowed, so that the collateral circulation has time to establish itself. Philippe urges that operation should not be deferred until the patient is *in extremis*.

Stimson and Abbe¹_{Feb. 16} advocate the introduction of a coil of very fine wire, and the passing through it of a strong electric current (of over 50 milliampères from thirty Smee cells) for fifteen to twenty minutes. They claim that relief is always given and that lessening of the tumors ensues. Autopsies had shown complete coagulation, the clots and wire filling up the sac.

Bramwell⁷⁶⁶_{July 26} expresses the opinion that, of all the surgical methods of treatment of thoracic aneurisms hitherto proposed, galvano-puncture is probably the least injurious and the most beneficial.

Macewen⁶_{Mar. 9} has proposed the introduction of needles into an aneurism in such a way that their points shall just touch the lining of the opposite wall. There would seem to be grave doubts as to

the efficiency of such a procedure, to say nothing of the risks attending it.

As to the treatment of aneurisms of the limbs, there seems to be a growing feeling, in the French school especially, in favor of the heroic procedure of total ablation. Delbet, in the elaborate article already referred to, recommends it. At the Fourth Congress of French Surgeons¹⁴_{Oct. 16} it was warmly advocated by Trélat, Mollière, and others. There were not wanting, however, those who adhered to the ligature, among them such men as Boeckel, Lucas-Championnière, Reclus, Verneuil, and Kirmisson. The views expressed as to the proper cases for extirpation or ablation have varied so much as to somewhat puzzle the reader, some regarding this course as especially adapted to small tumors, others commending it in the treatment of those which are large and thin-walled. It seems likely that further experience will show that other conditions than the mere size of the aneurism are to be considered in selecting this operation, which is often tedious and difficult, but which, when safely effected, has the great advantage of accomplishing a radical cure. As to the ligation of arteries in their continuity, Teale²_{Aug. 17} speaks strongly in favor of the application of two ligatures, with complete division of the vessel between them, the chief object being the avoidance of tension on the wall and the consequent risk of hæmorrhage in case of its giving way. Jackson²_{Aug. 31} makes an interesting historical note on this operation, which was known to Aëtius and Paulus Ægineta, and has been practiced by some modern surgeons with varying success.

ARTERIAL SYSTEM.

Weiss¹⁸⁴_{Jan. 1} mentions the use of two ligatures in close juxtaposition, in order to make the occlusion of the artery (cicatrice artérielle) more solid and better able to resist the blood-pressure. Murdoch²⁶⁹_{June} again urges the value of torsion of arteries as easier, safer, and less likely to interfere with healing than the ligature. Muscroft⁶¹_{Jan. 19} makes a further communication as to his method of controlling an artery in its continuity by passing a pin beneath it and applying a figure-of-8 ligature around the ends, alleging that it has been used with success and without accident in 12 cases. It seems difficult to understand how the risk of injury to the vein or nerves can be altogether set aside in many situations.

Phillips²⁵_{Aug.20} recommends the use of chloral in solution, given by the mouth, for the arrest of internal bleeding. Petrescu⁵⁴_{Oct.15} speaks highly of an old remedy, the decoction of the root of *Bryonia alba* (wild hops ?) as an internal hæmostatic in peripheral hæmorrhages. Kobert thinks it contra-indicated when the hæmorrhage is from the intestinal canal.

Our corresponding editor, Golowina, of Varna, Bulgaria,⁶⁷³_{Sept.} quotes from Michailoff some observations confirming the value of iodoform as a hæmostatic. St. Germain¹¹⁸_{Aug.} bears similar testimony in regard to antipyrin, reporting 2 cases in which severe bleeding after amygdalotomy was controlled by this remedy. Hénocque cites experimental and clinical observations in confirmation of these statements.

Meredith²_{Feb.16} calls attention to the effects of insanitary conditions—bad drainage, bad air, impure water, etc.—in favoring hæmorrhages.

Hare⁸⁰_{Sept.16} discusses the supposed dangers of entrance of air into the circulation; he thinks it is not fatal unless in very large quantity, and that in the cases of death ascribed to it there was probably some other cause, such, perhaps, as the formation of a clot.

Rogers¹¹²_{June} reports a curious case of multiple hæmatomata in a girl aged about 1 year. The mouth, orbits, and one popliteal space were the parts affected. The child had symptoms resembling those of infantile paralysis, with some undetermined lesion of the spinal cord, possibly due to injury at birth, as she was born unexpectedly while the mother was kneeling on the floor. Death took place at twenty months, preceded by no sign except excessive rapidity of breathing.

Neufeld⁶_{June 22} is quoted as having reported 3 cases in which extensive extravasations of lymph took place after the rupture, by external violence, of lymph-channels: in one case in the thigh, in a second in the back, and in the third in a locality not stated. Neufeld agrees with Gussenbauer in recommending early and free incisions.

Head and Neck.—Markoe¹_{Nov.9} reports a case of cirroid aneurism of the scalp in which both external carotids were tied with some apparent success, and it was intended to ligate other vessels supplying the tumor. The patient, however, was lost sight of, and later came under the care of Stimson, bleeding from an ulcerated

point on the scalp; excision was performed with every precaution, but the man died fourteen hours afterward. In connection with this case, Wyeth and Lange mentioned instances in which the tying of both external carotids had failed to prevent trouble from hæmorrhage in the removal of tumors, one of the nasopharynx and the other of the upper maxilla.

Wyeth⁵⁹_{Aug. 17} says that he made with success a ligation of the right external carotid preliminary to removal of the corresponding half of the tongue, with a mass of infiltrated glands, for epithelioma. A case of successful ligation of the external carotid for recurring hæmorrhage after a stab of the face is reported by Urazoff.⁹⁶_{Sept.} Lloyd²_{Jan. 5} records another for traumatic aneurism from a wound of the cheek by a hay-fork. Catuffe.¹⁵²_{Jan. 5} in a case of persistent bleeding after clipping of the soft palate, applied hæmostatic forceps, leaving them in place for twenty-four hours, with success. Clark²²_{May 8} reports a case of traumatic aneurism of the temporal artery from a blow which partially divided it; ligation was done with success. According to Sutherland,²⁸²_{July} Treves's temporary occlusion of the carotid failed in a case of traumatic arteriovenous aneurism just below the mastoid process; ligation above the omohyoid was then resorted to with good effect. MacCormick²⁶⁷_{Nov., '88} has recorded a case of aneurism by anastomosis, involving the occipital, posterior auricular, and temporal arteries, in a man aged 27; it had lasted seventeen years, often bleeding seriously. The common carotid was tied; eighteen days afterward part of the tumor was solidified by a current from twenty-four small Daniell cells, and another portion twelve days later; four months afterward galvano-puncture was employed, and, finally, after six weeks more, the auricle was removed with a clamp and cautery. Two years afterward he reported, and the trouble had not returned.

Deaver¹¹²_{Mar.} relates a remarkable case of aneurism of the internal, external, and common carotid arteries of twenty years' standing. Ligation of the common carotid in the lower triangle was performed successfully, but during the operation cyanosis occurred, and laryngotomy was resorted to, the tube being kept in place for six hours.

Rydygier³³⁶_{Apr. 16} proposes a new method of reaching the inferior thyroid artery, for which he claims the advantage of ease of performance and slight subsequent disfigurement. An incision 6 to 8 centimetres (3 inches) in length is made about 2 centimetres ($\frac{1}{2}$ inch)

above and parallel with the clavicle, reaching partly over the edge of the cleido-mastoid muscle, and dividing the skin, platysma and superficial cervical fascia; with the two forefingers the areolar tissue is now separated upward and downward so as to reach the inner edge of the scalenus anticus, when, with one or two blunt hooks, the cleido-mastoid, with the great vessels and the vagus nerve, are drawn inward and forward, and the thyroid axis, with the inferior thyroid curving inward away from it, may be seen.

Innominate Artery.—Warren, ⁹⁹_{May '90} in the case of a man aged 50, ligated the axillary and common carotid arteries for rapidly-increasing aneurism of the innominate and subclavian; only temporary relief was afforded, and on the ninety-eighth day fatal rupture ensued, the swelling having extended far up into the neck. After death the main aneurism was found to arise by a narrow neck from the anterior wall of the innominate artery, a second springing from the axillary at the point of ligation. The aortic arch was dilated to the size of a lemon, its walls calcified and thickened.

Pettus ¹⁴³_{Aug.} reports the ligation of the common carotid and third part of the subclavian for aneurism involving the innominate and carotid, and probably the aorta, in a woman aged 40, of intemperate habits. Five months afterward the patient continued well and was working as a cook.

A new procedure for the ligation of the innominate is proposed by Spencer, ²_{July '13} and has been tried successfully on the macaque monkey. (Selected because of the resemblance of the anatomy of the part to that of the human subject.) The incision is made in the median line, and the carotid found and tied through the inter-muscular spaces; this vessel then serves as a guide to the innominate. No drainage-tube need be employed. Spencer lays especial stress on the tying of the carotid and on the aseptic condition of the ligature.

Thoracic Aorta.—Suckling ²_{Nov. '16} is reported to have exhibited a patient aged 33, an iron-worker, who had been the subject of aneurism, causing bulging with pulsation at the left side of the spine below the scapula; after six weeks' rest in bed, with iodide of potassium, the pulsation and pain had ceased and the area of dulness on percussion was much reduced.

Cases of death from thoracic aneurism, without rupture, have been reported by Ely, ¹_{Jan. '19} Messenger, ¹_{Jan. '19} and Troup. ³⁶_{Mar.}

Högerstedt²¹_{May 6} records a rare case of aneurism of the ascending aorta, the rest of the vessel being atheromatous, and the heart atrophied rather than hypertrophied. He expresses the opinion that the effects of alcohol upon the inner arterial coat are far more injurious than those of the syphilitic poison.

Our collaborator, Bramwell, of Edinburgh,⁷⁶⁶_{July 26} reports a remarkable case, in which a sacculated aneurism of the ascending aorta and arch had attained the size of a child's head without producing any symptoms, and was only discovered just before it caused the death of the patient, who had been until a few days previously regularly employed at the Forth Bridge Works. The same author records another case in which an aneurism of the thoracic aorta projected for seven or eight years through the front of the thorax, the patient being all the time on duty as foreman of a large manufactory. Death finally occurred from its rupture.

Daraignez¹⁸⁸_{Sept. 15} reports a case in which an aneurism of the aortic arch gave rise, during life, to no other symptoms than attacks of oppression, like those of laryngeal asthma; death occurring suddenly in one of these, the autopsy revealed the true character of the lesion. Another case, in which the chief symptom was gastric oppression from involvement of the vagus nerve, is published by Rumpf.⁴_{Apr. 13}

Brieger⁴_{Sept. 9} records 2 rare cases: in one, a man, aged 58, presented a pulsating swelling extending from the first to the fourth rib and from the edge of the sternum to the nipple line (evidently an aortic aneurism), without causing the patient any annoyance. In the other, a man, aged 37, had difficulty of swallowing, paralysis of the left vocal cord, and severe palpitations; there was aortic insufficiency, and the diagnosis made was of aneurism. The radial pulses were alike,—a condition which Brieger thinks more common than it is represented to be in the text-books.

A child, 5 years old, was presented by Rie⁸⁴_{Apr. 13} to the Vienna Med. Doktoren Collegium, who had an aneurism of the ascending aorta, the duration of which could not be determined; there was no hypertrophy of the left ventricle of the heart.

Abdominal Aorta.—Cases of marked improvement under the use of Tufnell's method in aneurisms of this vessel are reported by Mutis,⁶_{May 18} Ross,⁶_{May 11} and Hood.⁶_{Feb. 16} Mutis's patient, a man aged 37, was treated for six months, at the end of which the tumor

had entirely disappeared; Ross's, a woman aged 21, for five months, with like result; Hood's, a man aged 39, had only been under treatment two months, but the tumor was smaller, harder, and less tender.

Cases of rupture of abdominal aneurisms through the diaphragm into the pleura are recorded by Harris⁶_{Dec.8} and by Drewry⁸¹_{July}. O'Connor²_{Mar.16} mentions one which burst into the arcolar tissue posteriorly, outside of the peritoneum, and Bezançon⁷_{No.7} one which burst into the peritoneum. The latter case is somewhat remarkable from the fact that the patient, a woman aged 84, had also an immense cerebral hæmorrhage, the onset of which caused her admission to the hospital. Loomis⁵⁹_{Jan.5} and Toussaint²¹¹_{Jan.6} have met with abdominal aneurisms which had caused no symptoms during life, the patient dying from other causes.

Pelvic Vessels.—A curious case is recorded by Barker²_{Dec.22,'83} in which a man, aged 48, with aneurism of the left external iliac artery, had been subjected to digital and instrumental compression, apparently without success; he was chloroformed with a view to ligation, and the incision was made through the skin, when he moved the limb suddenly and all pulsation ceased in the tumor, consolidation occurring and remaining permanently.

Lucas⁶_{June 29} is reported to have tied the common iliac artery for aneurism of the external iliac; the patient was doing well. The vessel was reached through the peritoneum by a median incision, the intestines being held aside. Küstner⁶⁹_{Nov.17}; ⁵_{Nov.} records a case of profuse hæmorrhage into the peritoneum after removal of a cancerous ovary; the pedicle was tied again, but collapse ensued, and intra-venous injection of a saline solution was resorted to; a fresh failure of strength occurred, and the saline solution was thrown into the abdominal cavity, with relief, the patient recovering. The question is raised whether it would not always be good practice to leave some water in the peritoneum after it has been surgically opened.

Upper Extremity.—An elaborate paper by Morozoff and Michailoff¹⁰⁰⁸_{No.10}; ⁹⁶_{May} on ligation of the subclavian artery has appeared. From the statistics contained in it the value of antiseptics is strongly shown, and especially in regard to the simultaneous tying of this vessel and the common carotid in cases of aneurism. In ligations for hæmorrhage the mortality exceeds 50 per cent.

Cures of cases of subclavian aneurism have been reported: By dieting and iodide of potassium, by Barton²_{Mar. 30}; by iodide of potassium and the continuous current, by Valladares³_{Feb. 13}; by electro-puncture continued during fifty-five days, by Saboña²⁶_{Mar. 1}

Browne²_{May 18} records a case of traumatic aneurism of the subclavian from a stab; eight months afterward the sac had burst and an enormous diffuse aneurism had formed in the neck; death ensued three weeks later. It was found that the innominate had been pressed over toward the left; so that it would not have been met with in its normal position if an operation had been undertaken at a late stage of the case.

Traumatic aneurisms of the brachial artery, treated by ligation and incision, are reported by Trélat (Cellier's case)¹⁷_{June 18} and Huntington.¹⁴⁷_{Aug.} In the former case, that of a woman aged 43, there was some suppuration of the wound and some atrophy and permanent loss of function in the limb. Trélat could refer to only 4 similar cases. Lucas-Championnière thought the antisepsis had been defective, and that the double ligature (without extirpation) would have avoided the damage to the median nerve, which probably impaired the result.

Stenzel⁴_{Apr. 1} reports the case of a butcher, aged 56, who had a pulsating vessel as large as the brachial close under the skin and tortuous at the bend of the elbow. By reason of the small amount of subcutaneous fat, this vessel could be lifted up and compressed, when the radial and ulnar pulses ceased at the wrist; drawing it aside, the pulsation of a smaller vessel was felt in the normal site of the brachial. Hence, it appeared that the radial and ulnar arteries arose from a common stem given off at an unusually high point.

Pluyette¹⁴_{June 23} has recorded a case of spontaneous aneurism at the bend of the elbow in a man aged 28 years, the subject of aortic insufficiency and albuminuria. Compression having caused sphacelus, the artery was cut down upon and tied, and the clots then turned out; the lower end of the vessel could not be found and tied, and a hæmostatic forceps was put on. The ligature came away at the end of fifteen days, healing having taken place with very slight suppuration. A week later the patient died of the cardiac disease. Embolism was thought to have been the cause of the aneurism. In a case reported by Mott,²_{Apr. 10} a boy, aged 13,

had aneurisms in the radial and ulnar arteries of similar origin, from infective endocarditis with vegetations.

Beach⁹⁹_{Oct.24} reports a case of traumatic aneurism of the ulnar artery, treated with success by ligation above and below and opening the sac.

A case of cirroid aneurism of the palm of the hand, from a sprain of the metacarpo-phalangeal joint of the middle finger, is recorded by Tellier.²¹¹_{Aug.18} The patient, a woman aged 28, had met with the accident seventeen years before; the veins were swollen and tortuous, and the local temperature was 100° F. (37.8° C.), as against 92° F. (33.3° C.) on the sound side. On amputation of the finger, the bones were found to be eroded. Poncet thought there were arterial varices of the bones similar to those met with in the soft parts. A curious case is mentioned²_{Mar.23} in which a man died in fifteen minutes from hæmorrhage from a wound of the arm by glass, part of a window having fallen on him.

Lower Extremity.—Stimson¹_{Aug.10} showed to the New York Surgical Society a patient in whom he had ligated the external iliac artery for a large ilio-femoral aneurism; the vessel was reached through the peritoneum by an incision along the outer border of the rectus abdominis muscle, and tied with catgut. Two weeks later the dressings were removed and the wound was healed.

In a case of traumatic aneurism of the right thigh, Sibthorpe²_{Apr.20} tried compression and Reid's method without success. He then ligated the superficial femoral, applying two threads of carbolized silk and dividing the vessel between them; an abnormal vein was also tied. The patient, a man aged 30 years, recovered. Wyman⁶¹_{Mar.2} records the ligation of the femoral artery and vein for a stab wound, completely dividing the former and partially the latter, in a boy of 19 years; death ensued from gangrene on the fifteenth day. Huger⁶⁴⁷_{June} reports a case of traumatic aneurism of the femoral from a pistol-shot wound in a negro aged 23 years; gangrene occurred in the foot and amputation was done below the knee; the stump sloughed, but this was controlled, and the femoral artery was tied. Gangrene came on afresh, and there was suspicion of septicæmia; amputation was therefore performed through the thigh, and the patient finally recovered. A successful employment of digital compression, continued for

sixty-five hours, in an aneurism of the femoral artery, is reported by Deaver.¹¹²_{Mar.} The patient was a man aged 47 years.

Three cases of popliteal aneurism are recorded by Ormsby.²²_{Sep. 4} One, in a seaman aged 40, was cured by compression by two tourniquets for twelve hours on two consecutive days, followed on the second day by an Esmarch bandage to the thigh; next day the pulsation stopped, apparently of its own accord, and did not return. Fifty-five days afterward the man died of heart failure, and the aneurism was found firmly consolidated. The second, in a man aged 49, was cured by eight hours' pressure with two tourniquets. The third had a singular history: the man was 42 years old, and was subjected, without benefit, to forced flexion of the knee for forty-eight hours; he was afterward sent up to Dublin, and during the five hours' journey sat perfectly still; the tumor was then found to be entirely firm and free from pulsation. In another case, reported by Mackenzie,²³⁵_{Mar.} a coolie, aged 33, was subjected to Reid's method for an hour and a half, and then to digital compression for two hours; twenty days later, to Reid's method for two and a half hours, and then a tourniquet was applied for five hours, when pulsation had ceased. Weiss¹⁸⁴_{Dec. 1, '78} records a case of popliteal aneurism in a man aged 60, in which Reid's method failed, and a ligature was applied to the femoral artery with success. Sagrandi²⁴³_{Apr.} reports the case of a Turk, aged 24, with aneurism at the lower part of the ham, in which progressive flexion of the knee was made, being completed in eight days; the aneurism was cured, but the joint was stiffened at a right angle. Gradual extension was now attempted, but after three weeks arthritis compelled its abandonment; a week later the limb was straightened under chloroform, and a good result was obtained. Apropos of 2 cases successfully treated by ligation of the femoral by Brun, Reclus³_{Dec. 26, '88} advocates this method, the artery being secured as close as possible to the aneurism; he dwells upon the fact that digital compression, besides being troublesome, is not free from danger. Delbet⁷_{Nov. 2} records a case of very large arterio-venous aneurism of the ham, the result of a pistol-shot wound received nine years previously, the man being then 14 years of age; all the veins were greatly dilated as far as the ankle, and ulcerations had occurred on the leg. Extirpation was performed by Trélat, with what result could not yet be told. A case of inflamed diffuse

aneurism of the popliteal, in which an attempt at extirpation failed and amputation was performed by Demons, is reported by Princeteau.<sup>188
Sept.8</sup> Several instances of double popliteal aneurism are to be noted. In one, reported by Hunt,<sup>62
Mar.1</sup> the trouble occurred first on the right side, and digital compression was successfully employed; eight years later (on the left side) the multiple tourniquet devised by Hopkins was used with like benefit. Another, in which the interval was only nine months, is recorded by Richards.<sup>9
Apr.6</sup> the patient was a man aged 53, and digital compression effected the cure, on one side in forty-four and a half hours, on the other in fifty. Michael.<sup>104
Nov.23</sup> records the case of a man, aged 37, in whom first one femoral artery was tied, and thirty-two days later the other, with good result. Ballance.<sup>2
Dec.15,'88</sup> mentions a case in which he tied the left femoral of a man 34 years old, the right having been ligated by Lister eight years previously. Cauchois.<sup>203
Dec.15,'88</sup> apropos of a case of double popliteal aneurism, declares his belief in an "aneurismal diathesis" as occurring in some instances. He thinks the milder methods—compression, flexion, etc.—should be tried first, although they are in many cases ineffective. These failing, when the tumor is small, circumscribed, resistant, and free from inflammation or surrounding lesion, the femoral may be tied. Extirpation should be resorted to when there is a large, ill-circumscribed, thin-walled sac interfering with the nutrition and movements of the limb and with menace of joint-involvement or of inflammation.

White.<sup>112
Sept.</sup> reports a cure of an aneurism of the posterior tibial artery, in a man aged 35, by combined compression and flexion, kept up for eight days. A case of spontaneous (?) aneurism of the anterior tibial artery, $1\frac{1}{2}$ inches (3.8 centimetres) above the ankle, is reported by Bell.<sup>6
Oct.19</sup> The patient was a coolie aged 38. Flexion, with a rubber bandage, was tried for five hours and next day for three hours; two days later the rubber bandage and an Esmarch tourniquet were used for two hours and a half, and then digital compression for seven hours; there was no pulsation in the tumor after the tourniquet was applied.

Several cases are reported illustrating the gravity of wounds of the arteries of the leg. Anderson.<sup>2
Feb.16</sup> treated a boy, aged 15, whose knee had been crushed between cars; a fluctuating swelling was incised and drained, only serum and dark clot escaping; a

week later there was furious hæmorrhage, intra-venous injections of saline solutions being twice employed to save life. The popliteal artery, partly torn across, was tied above and below. In another instance, reported by Battle,²_{June 1} a like lesion of the posterior tibial artery near its origin resulted, in a man, from a slight strain of the knee. Ligation of this vessel, as well as of the popliteal and anterior tibial, was performed, but the wound had broken down some twenty times. Wilkinson⁵⁹_{Nov. 16} records a case of traumatic aneurism of the anterior tibial artery in an intemperate man aged 38; after four severe bleedings had occurred the tumor was extirpated, a ligature being applied above and below; five days later he bled again, and the artery was tied above, in a healthy part, with success.

Arnaudet¹⁷_{Oct. 15} relates a case of fracture of the upper third of the leg, the upper fragment threatening to pierce the skin. On the twenty-second day there was chill, pain, œdema of the leg, fluctuation, and the fragments were disjoined; puncture of the supposed abscess was performed, but only blood escaped; a splinter of the bone was found lying across the (posterior?) tibial artery. The femoral was now tied, but pyæmia ensued, and the man died on the twenty-seventh day afterward.

VENOUS SYSTEM.

Rockwell¹⁵⁷_{Apr.} discusses the general subject of treatment of hæmorrhage from large venous trunks. In the neck, wounds of the internal jugular have been treated with success by every known method; compression is the only resource when the lesion is high up near the jugular foramen. In the axilla lateral ligation answers best, but sometimes the whole trunk may be encircled, if the collateral vessels are undisturbed; the axillary artery should also be tied. The same rule applies in the femoral region. I have myself twice recently employed forcipressure with the best result, once at the root of the neck in a very severe wound, much blood having been already lost, and once in the axilla, in an extirpation of a large mammary cancer, with a mass of glands.

Bradford⁹⁰_{Aug. 29} succeeded in tying the internal jugular vein, wounded in an operation for wryneck in a girl aged 8. A curious case of dilatation of the internal jugular vein, simulating carotid aneurism, in a woman who had been the subject of rheumatism, is recorded by Moussous.¹⁸⁸_{Apr. 23}

Deaver¹¹²_{Mar.} mentions a case in which, from rupture of the right lobe of the thyroid body and its plexus of veins, a large effusion of venous blood took place, causing such pressure upon the trachea as to require the opening of that tube. Suckling²_{Mar. 6} records a case of varicose enlargement of the superficial abdominal veins, the result of portal obstruction; there was no pulsation, but a venous hum. The patient had had syphilis, had been twice jaundiced, and was addicted to drink. Goodhart⁶_{May 11} gives a rare case of arterio-venous aneurism of the splenic vessels, proving fatal by rupture, in a woman aged 49; the gastric and mesenteric veins were thrombotic, and hence there was inflammation of an extensive area of the ascending colon. Wolfner⁴_{Sept. 23} reports a case of multiple venous thrombosis, with great obesity, in a man aged 47; relief was afforded by diet, exercise, and peat-baths.

Jaboulay and Condamin²¹¹_{Sept. 27} discuss the channels by which the collateral circulation is established after ligation of the femoral vein high up, viz., a posterior, through the ischiatic and gluteal veins; an antero-internal, through the external pudic and obturator, with some veins on the opposite side; a deep posterior, through the sacral, lumbar, and azygos.

Maubrac⁵_{Sept.} in wounds of the femoral vein, advises a tampon of iodoform gauze; if this fails, suture or lateral ligation of the wound, or, when this cannot be done, ligation of the venous trunk, with compression of the artery. Should it be necessary to tie the latter vessel, it should be done below the point of origin of the profunda. A case in which the femoral vein was torn in the course of an operation upon the inguinal glands, a ligature being applied above and below, and the vessel divided between, is reported by Dudon.¹⁸⁸_{Mar. 12} The issue was not yet known.

Richet¹⁰⁰_{June 27} records a fatal case of phlebitis of the femoral vein after an amputation of the thigh for osteo-arthritis of the knee. A singular case is reported by Turner,⁶_{May 18} in which a man aged 31, syphilitic, had a fall on the buttock, which was followed by inflammation of the inguinal glands and a periphlebitic gumma, destroying the coat of the femoral vein; on the free opening of the swelling a blood-cast of the vein was seen lying loose in the cavity.

Jeanselme¹⁰⁰_{Mar. 5} calls attention to certain symptoms connected with varices of the internal saphena vein, dependent upon insufficiency of the valves: impulse on coughing, expansion, thrill, and bruit.

An elaborate essay has been published by Broca⁹¹ on the inflammation to which varicose veins are liable. It may be either simple or suppurative, and may arise from various causes—thrombosis, fatigue, privations, exposure to cold, etc. Sometimes it seems to occur spontaneously. The illustrative cases cited are well worthy of study.

A number of writers have discussed the treatment of varicose veins. An ointment composed of 50 grains (3.2 grammes) of pepsin to $\frac{1}{2}$ ounce (15.4 grammes) of lanolin is recommended by Douglass⁵⁹ as a dressing for varicose ulcers and foul sores. Godwin² advocates the injection of $\frac{1}{2}$ minim (0.03 gramme) of carbolic acid into varicose veins, an Esmarch tube having been first applied above. No anæsthetic is necessary. This plan is said to be best adapted to cases in which there are clustering varices.

Patterson² reports the case of a man, aged 21, with a very much distended and tortuous saphena vein, which was treated by inserting beneath it a number of hare-lip pins, over each of which a bit of bougie was placed and secured with a figure-of-8 ligature. Four drops of liq. ferri perchlor. were then injected into the vein, and the limb was suspended. The pins were kept in place ten days; the ultimate result was the conversion of the vein into a firm fibrous cord.

Total excision of varicose veins in severe cases, as performed by Madelung, is recommended by Boennecken.⁴ It is also favorably spoken of by Bennett⁶ in a somewhat elaborate discussion of the various forms of the disease and of its treatment, especially by "open" operation. McKay²⁸⁴ also advocates it, giving 2 cases in support of his views.

Lang³⁶ showed to the Edinburgh Medico-Chirurgical Society a woman in whose case Maclaren had resorted to a different operation; he had retrenched the skin at the back of each leg from the knee to the tendo Achillis with a very good result.

Perhaps this is as appropriate a place as any to mention that Grube,³³⁶ apropos of a case of fat embolism observed by him, states that this condition may come on as late as two weeks after the injury; that the fat may be derived from the soft parts as well as from bone, and that it is not continuously thrown off by way of the kidneys. He regards the embarrassment of breathing and the fall of temperature as the chief diagnostic marks of the disorder.

ORAL AND FACIAL SURGERY.

BY RUDOLPH MATAS, M.D.,

NEW ORLEANS.

JAWS.

Periostitis.—A valuable lecture on periostitis of the lower jaw was published by W. Herzog.³⁴ ^{Mar. 5} A case of grave septic periostitis of the lower jaw complicated with hæmorrhage, requiring the ligature of the common carotid, is reported by Augt. Walker,²¹⁴ ^{May 5} Solothurn, Switzerland.

Necrosis.—An interesting case of necrosis of the lower jaw, associated with dentigerous cyst, containing an unerupted wisdom-tooth, is reported by Funkhouser, of St. Louis.⁶⁵ ^{Dec., '88} Clement Lucas, London,⁶ ^{Oct. 5} has lately recorded 2 cases in which exfoliation of the alveolar processes of the jaws seemed to follow an attack of measles. The disease appeared to be confined to the alveolar process. Contrary to the experience of Lucas, and interesting as associated with other bone-lesions connected with typhoid fever, are 2 other cases of alveolar necrosis connected with this disease which are reported by J. G. Blackman, Portsmouth, Eng.,⁶ ^{Oct. 19} and by M. Culpin, Stamford Hill, Eng.⁶ ^{Oct. 12} In both of these cases the upper and lower jaws were affected with the necrotic process.

Our corresponding editor, F. Eklund, of Stockholm, Sweden, also communicates an abstract of an article by K. Jervell³⁶⁹ ^{Feb.} on a new method of operating in the treatment of phosphorus-necrosis of the lower jaw. This observer was led by various considerations, both practical and theoretical, to consider as objectionable either of the two opposite practices usually recommended in the treatment of necrosis of the lower jaw, viz., (1) to operate before the full detachment of the sequestrum, or (2) to operate after its complete demarcation. Jervell has made a sort of compromise between the two, which has given him much satisfaction in a case which he reports in detail. He operates in two sittings. In the first operation an incision is made along the lower border of the

jaw, by which all the soft parts, including the periosteum, are incised to the bone; the periosteum is completely detached, together with the osteophytic layer, until the necrosed bone remains bare. A very thin layer of iodoform gauze is then introduced between the bone and the periosteum. Five weeks later the necrotic bone is excised. During this time the periosteum has become a firm bony capsule, which has the shape of the jaw, so that the outline of the maxilla is preserved after the removal of the sequestrum. This method of sequestrotomy is applicable in the removal of other bones,—the tibia, for instance.

The value of hydrogen peroxide is extolled by A. Lohmann, of Cassel, ⁶⁹_{p.554} ⁶_{Sept.23} in the treatment of alveolar necrosis of jaws. Pyorrhœa alveolaris is curable by this agent, according to the author.

Fractures and Dislocations.—One of the most original and valuable papers on maxillary prosthesis after resection of the lower jaw is by C. Martin, of Lyons. ¹⁰⁷⁷ The most notable result obtained and taught by Martin is the remarkable tolerance of fresh wounds for foreign prosthetic bodies and their thorough incorporation with the tissues in which they lie imbedded, without any serious consequences, and, on the contrary, the most happy results as regards the correction of large and serious osseous defects. The appliances of Martin are of two kinds in resection of the lower jaw, viz., appliances intended to remain permanently *in situ*, and others of a purely temporary character, solely intended to correct momentary defects, etc.

At the meeting of the Surgical Society of Berlin, held July 8th, C. Sauer, ⁴_{Oct.14} demonstrated his peculiar interdental wire-splint, which he has previously described, and has had occasion to try successfully in 3 very severe fractures of the jaws in the practice of Berlin surgeons.

All the sequelæ of a compound fracture, with dislocation of the lower jaw, in a drunkard attacked with *mania à potu*, which culminated in death, are graphically described by Richet, ¹⁰⁰_{May 7} in a masterly lecture at the Hôtel Dieu.

From anatomical considerations some hesitation has generally been felt about recognizing the possibility of backward dislocation of the lower jaw, but an interesting editorial commentary on a case reported by Coe, ¹_{June 8} discusses the evidence recently furnished by

Thiem,³⁶³_{Mar.22} and demonstrates pretty conclusively that this dislocation can exist.

Girin, of Montbrison,⁶⁷_{Mar.30} describes a new manœuvre for the reduction of dislocation of the lower jaw: "The surgeon places himself standing behind the patient, who is seated. The left hand is applied to the forehead of the latter, which helps to fix the head on the surgeon's chest. The thumb of the operator, well protected by a handkerchief or towel, is now introduced between the jaws in such a manner that the metacarpal region of the thumb lies between the dental arches, and that the four remaining fingers are flexed tightly over the lower border of the jaw on the corresponding side; by this means the lower jaw is well grasped by the hand. The surgeon now presses downward, with a slight tendency backward, and at once the dislocation is reduced."

Charles E. Luce,⁹⁹_{July 4} details several laboratory experiments performed with the view of ascertaining the exact movements of the condyle of the lower jaw. He has discovered that few anatomists are absolutely correct in their description of these movements. From his experiments he concludes that, even while opening the mouth to a small extent, the condyle moves forward and performs quite a considerable excursion, contrary to the assertion of Gray and others to the effect that in small (mouth) openings the condyles simply rotate on a transverse axis against the fibro-cartilages.

Again, it is stated by Morris, Humphrey, and others that the condyle never quite reaches the summit of the eminence; most tracings show that it does reach the summit, and even begins to mount the anterior side. There are exceptions to this owing to individual variation.

Ankylosis.—Several interesting cases of operation for the relief of this serious and troublesome condition have been reported during the year. At the Royal Infirmary, Newcastle-on-Tyne, F. Page,²_{Mar.23} operated on a little girl, aged 9, for right temporomaxillary ankylosis by resection of the condyle of the lower jaw. A successful result followed.

A more difficult and interesting case is reported by W. H. Bennett,⁶_{May 18} in which closure of the jaws from bilateral ankylosis was successfully treated by *excision* of both angles of the inferior maxilla after the complete failure of other methods (viz., resection

of condyles and neck of both sides and later 1 inch—0.025 metre—of the left ramus). Another case (unilateral), operated by J. Dunlop, ²¹³_{Sept.} was successfully treated by excising the condyle of the right side ($\frac{3}{4}$ to 1 inch—0.018 to 0.025 metre—vertical space between teeth three months after operation).

Another case of "excision of the neck and condyle of the right inferior maxilla for ankylosis of the temporo-maxillary articulation" is reported by C. P. Harrigan, of Omaha, Neb. ¹⁰⁶_{Sept.} A notable feature of this case is that, notwithstanding the large amount of callus thrown around the seat of fracture, it never fully interfered with the function of the jaw until twenty months after the receipt of the injury, when a complete ankylosed condition of the temporo-maxillary articulation moved the parents of the child to seek relief for this condition. The operation was followed by marked success.

Tumors.—Three instances of dermoid cysts in the intermaxillary cleft have been reported by Lannelongue. ²_{Mar. 9} These rare cysts occupy the intermaxillary space in the masseteric region. The anatomical situation, age of subjects, and history of these cases are good bases for differential diagnosis. Lannelongue removed the cysts by incising their mucous investment on the inner aspect of the mouth.

Holger Mygind, of Copenhagen, corresponding editor, contributes a short abstract of a valuable monograph by Haderup, ¹¹⁰³ giving the results of observations on 64 cases of maxillary cysts in 56 patients. Out of these, 50 were diagnosticated as *kystes périostiques des mâchoires* (Magitot), the author designating them as "teeth-root cysts;" 10 were "follicular cysts of the jaws" (Broca), the author calling them "teeth- or sac- cysts;" while in 4 cases no connection whatever with the teeth could be discovered.

The author is led to the conclusion that the first kind of cysts are due to the development of small, soft fibromata, which frequently originate at the apex of the root of necrotic teeth by softening of the central part. The contents of the cysts were in 24 cases of serous character, in 11 sero-purulent, in 11 purulent, in 4 caseous. The ages of the patients varied from 14 to 47 years; all the patients with follicular cysts were children, these cysts being observed only in connection with the milk-teeth. The female sex was twice as strongly represented as the male. The treatment con-

sisted in extraction of the tooth, incising the tumor, and plugging the cavity with cotton soaked in "thymol-spirit," or iodoform gauze, followed by frequent antiseptic mouth-washing.

A case in which a dentigerous cyst (containing unerupted canine) in the antrum was mistaken for a sarcoma of the superior maxilla is very instructively reported by Gérard Marchant, the operator, with an appended report on the histological examination by Albarran.^{7 Feb.} The only way to avoid a similar error, which in this case appears to have been unavoidable, is, in doubtful cases, to explore the antrum with a trocar, so that if a tooth is lying loose or encysted, or attached to the walls of the sinus, it may be detected. In this case resection of the superior maxilla was performed, and the patient, aged 10, made an uncomplicated and prompt recovery.

An instructive contribution to the statistics of tumors of the jaw by Eugene Birnbaum, of Berlin,^{301 B. 23, H. 6; 96 Sept.} presents a compilation of all the tumors of the upper and lower jaw occurring in the clinic of Küster, in Berlin, from 1871 to 1887, inclusive. There are 63 tumors described, 42 of the upper and 21 of the lower jaw. Of the 42 tumors of the upper jaw, 19 are carcinomata, 15 sarcomata, 2 adenomata, 2 fibromata, 3 cysts, and 1 specific new growth. Ten of the tumors of the lower jaw are carcinomata, 7 sarcomata, 3 cysts, and 1 osteoma. The cases are well analyzed. Other cases of tumors of the jaws are reported by other operators as follows: An osteo-sarcoma of the left superior maxillary, extending to the right alveolar process, in a white male aged 19. Partial resection of the right maxillary and total removal of the left upper jaw, excepting its orbital plate; complete cicatrization in forty days. No recurrence five months after operation. Santiago Veve, Puerto-Rico,^{459 July} operator. A subperiosteal osteoma of the inferior maxilla, due to vicious evolution of wisdom-tooth, successfully treated by extirpation, reported by Jalaguier.^{3 Apr. 24} A paradental epithelioma, presenting all the signs of a sarcoma of the inferior maxillary. Resection of the maxilla. Apparent cure, by Polaillon.^{17 Mar. 26}

Two cases of resection of the superior maxilla, for the removal of basilar pharyngeal and naso-maxillary polypi, are reported by Ignacio Plasencia, of Havana^{459 May}; both cases ended in recovery notwithstanding serious operative complications.

A curious and certainly remarkable case of sarcoma of the superior maxillary, "cured" by electrolysis, is reported by Mermod,

of Geneva, Switzerland. ¹⁹⁷_{Dec. 20, '88} After reporting the clinical history and appearance of the growth, the patient being a young girl aged 22, otherwise healthy and strong, the author states: "We have to deal with a sarcoma of the superior maxilla which is confirmed by microscopic examination; furthermore, we are not dealing with an encysted or well-encapsuled tumor in an osseous shell, but with an infiltrated growth, without fixed boundary-lines, which has invaded the major portion of the jaw, and that in a very short space of time. At first sight the only treatment applicable to such a case would be a complete resection of the maxilla; this was the opinion of our colleague, Roux, to whom we referred the case. A partial resection would have been not only insufficient, but aggravating. I certainly would not have hesitated to extirpate the whole jaw, but the family energetically objected to the operation."

In view of this opposition, the author thought of electrolysis and decided to apply it. "At the first sitting I limited myself to the introduction of a single needle in the centre of the most prominent fungoid mass (in the mouth); eight days after, a surprising change: the fungosities had notably shriveled. At the following sitting and at intervals of eight days I plunged the needle deeply into the maxilla in all directions, always starting by the alveolar border. Each sitting lasted about twelve or fifteen minutes, and the current strength did not exceed 25 milliampères. After the tenth sitting the cure appeared to be complete, and it has been maintained up to date, *i.e.*, five months since. The bone (which, when the case was first seen, was broken up, softened, and infiltrated) appears to have resumed its normal consistence; the teeth, which were loose, are now firmly implanted in their sockets, and the alveolar cavities, where the teeth are missing, are filled with a firm cicatricial tissue that is perfectly normal in appearance."

What shall we think of this case? From the author's text and his statements we cannot doubt his ability to differentiate a malignant from a benign growth, and even if there should have been an error in diagnosis it would be difficult to understand how any other kind of growth could have responded so kindly to so simple and mild a treatment as appears to have been applied to this case. We can only report the case and call the attention of all surgeons to it, hoping that future repetitions of similar results will tend to disprove the present general and well-founded skepti-

cism of most experienced surgeons in the curative value of mild electrolytic currents—and even very powerful ones, too—in the treatment of malignant growths.

Tomes⁶_{Apr.20} reports a case of paradental epithelioma, caused, possibly, by dental irritation, in which, after partial extirpation of the upper jaw and cheek, the disease was eradicated and has not returned in three years.

Technique of Maxillary Resections.—Instead of the usual free facial incision for excision of the upper jaw, L. Heusner⁶⁹_{Feb.21} advises a much smaller wound. Somewhat below the infra-orbital foramen he makes a transverse cut $1\frac{1}{2}$ inches (0.037 metre) long. By means of a chisel the infra-orbital canal is laid open and the infra-orbital nerve and artery are freed. By blunt dissection, carried on partly through the wound and partly through the mouth, the soft parts are detached from the bone. Division of the osseous processes is accomplished by means of the chain-saw. A figure of a woman operated by this method, exhibiting an excellent cosmetic result, is appended to the article, but, as remarked by J. Wm. White,⁵_{Oct.} it should be borne in mind that the scar of the ordinary extensive incision made in this operation is neither conspicuous or unsightly. This point is well shown in a report of a case of sarcoma of the superior maxillary operated on by H. Scherck, of New Orleans,¹²_{July} in which Fergusson's incision was adopted.

R. del Castillo-Quartiellerz⁶_{Apr.6} has devised a plan for excising the inferior maxilla which he thinks a great improvement on the ordinary methods, both from a surgical as well as an æsthetic stand-point. The method consists essentially in passing a specially constructed trocar through the skin, behind the ramus, into the mouth, and then making use of the cannula as a guide for a chain-saw, by means of which the excision is to be carried out. This procedure has, of course, to be repeated on the other side. The only wounds of the skin are the two small openings made by the trocar, the cicatrices of which are small and do not disfigure the patient; there is very little hæmorrhage, and, there being but a comparatively small wound, the amount of suppuration, and consequently the risk of weakening the patient, is less than in the usual operation. It is presumed that, once the osseous sections are effected, the bone must be dissected off subperiosteally by intra-buccal dissection.

MOUTH.

Salivary Glands.—Judging by the number of cases of salivary calculi reported in the journals this year, it would appear that salivary lithiasis is not the rare condition it is represented to be. Cases are reported by Princeteau¹⁸⁸_{Nov. 3} at the Société d'Anatomie et de Physiologie de Bordeaux, July 22d; Clark,²_{Apr. 27} Parry,²_{May 15} Brown,²_{May 25} Pilliet,⁷_{Jan 25} Radouan²⁴³_{Sept.} (in all, 6 cases), in which calculi were extracted from salivary ducts, in some *per vias naturales*, others by incision, and some by ulceration. In all cases but one the calculi were formed in Wharton's duct; in the single case the calculus was lodged in Stenson's duct. In most cases obstructive symptoms existed.

Wounds of Salivary Ducts.—Guder¹⁹⁷_{Sept.} reports the case of a laboring man, who, in a drunken brawl, was cut across the cheek, the wound involving Stenson's duct. After the wound healed a fistula remained which communicated with the duct. A single application of nitrate of silver sufficed to close the fistula and effect a cure.

Spitzer⁸⁴_{June 14} reports a case in which Stenson's duct was divided while excising a tumor of the face. The glandular end of the duct was dissected a short distance back and inserted into the mouth, and the wound very carefully sutured. Perfect union followed this procedure.

Congenital Ranula.—A case of this kind, occurring in a newborn infant, is reported by Menocal de Cardenas.¹¹⁸_{Nov.} The tumor was very large and caused the tongue to protrude out of the mouth, preventing the jaws from closing and causing the cheeks to bulge out prominently. Suckling was impossible and nutrition much interfered with. The cyst was emptied with a trocar and found to contain 90 grains (4.83 grammes) of aropy liquid. The sac was incised and swabbed with a piece of nitrate of silver (Gross and Tillaux's method); but it refilled one month after, when it was finally cured by passing a carbolized seton through it. Since saliva is not secreted in foetal life, the author believes that congenital ranula can only be caused by a dropsy of Fleischmann's bursa.

Suppuration of the Salivary Glands.—An interesting and important contribution⁷⁵⁶_{July} has recently been made to the pathology of the remarkable form of inflammation of the salivary glands—

most commonly the parotid—which sometimes occurs in the course of the specific fevers or septic inflammations of other parts. The association of parotitis with abdominal inflammatory disease is well known. The condition has generally been attributed to metastatic or pyæmic infection; but this is not the conclusion arrived at by A. Hanau⁷⁶⁸_{B.4.H.5} in his paper on the origin of suppurative inflammation of the salivary glands. He describes 5 cases of the disease occurring in the course of (1) pneumonia, (2) pyosalpinx with peritonitis, (3) phthisis with thrush, (4) bilateral metastatic parotitis in pyæmia, and (5) suppuration of the submaxillary glands with perityphlitic abscess. The histological examination showed that the inflammation commenced in the ducts of the glands, and masses of micrococci mingled with pus could be seen filling the ducts. Hence, it was inferred that the gland had been infected from the mouth, and that its involvement had nothing to do with metastasis from a primary focus elsewhere in the body.

Epulis.—De Larabrie³⁶⁰_{Jan., Mar.}⁹⁰ reports that out of 1156 tumors that have been examined during the last eleven years at the Laboratory of Nantes, 32 have been of the above nature. Of these, 4 were in-patients of 5 to 15 years, 12 of 15 to 40 years, 8 of 40 years and upward. Eighteen tumors were removed from females, 5 from males; 9 were seated in the lower jaw, 7 in the upper. The differences of opinion that exist as to their character are considered, and the author says that he has not found either a lipoma, angioma, dental aneurism, or enchondroma in the number, and there is no evidence of its ever being epitheliomatous. In opposition to several authorities quoted, he states that 9 were true fibromas, 6, however, being partly myxomatous; but he confirms the view that sarcoma is the commonest form, this being typically myeloid in character.

Polypus of the Gum.—A. W. W. Baker¹⁶_{Sept.} read a paper on this subject at the meeting of the Royal Academy of Medicine of Ireland. These tumors vary from the size of a pea to a horse-chestnut, and are found on the gum in the neighborhood of diseased teeth. They are said to be caused chiefly by the ragged edge of a carious tooth, but it is probable that the ptomaines resulting from the operations of the bacteria in the dentinal tubules have more to do with their etiology than is usually supposed. Wedl and Rothman, in their writings, support this view. The growths in question are essentially papillomatous, and exhibit on

section large, branching papillæ, covered with a thicker layer than normal of squamous epithelium. The polypi are purely local in their origin and are non-malignant.

Baker believes with Scott, who discussed this paper, that these growths are an advanced link of connection between papillomata and epithelioma, between which, however, there was a well-known clinical difference.

Anæsthetics in Dentistry.—At the Brighton meeting of the British Dental Association, held August 21st to 24th, the subject of anæsthetics in dental surgery was discussed ^{Sept. 14} in a series of five papers, in which the views of the various schools of thought were ably expounded. The Dublin school, who principally favor ether for prolonged operations, was represented by a paper from F. R. Cruise. The merits of chloroform naturally found their champion in a Scotchman, Bowman McCleod, of Edinburgh. Dudley Buxton, of London, contributed a valuable treatise on the exact nature of nitrous-oxide narcosis, illustrated by pulse-tracings; and Frederick Hewitt (London) completed the subject by discussing several anæsthetic mixtures. The most interesting portion of this paper consisted in the account of some original researches by the author into the effect of the exhibition of 1 part oxygen and 7 parts nitrous-oxide gas. Hewitt's experiments in this direction had not extended over a sufficient length of time to enable him to dogmatize upon the question, but his results so far seemed to show that the mixture of $\frac{1}{8}$ oxygen increased the anæsthetic period and robbed it of many of its attendant unpleasantnesses, such as blueness of the face and stertorous breathing; in fact, it was evident, from a demonstration given after the paper was read, that the anæsthetic produced by this mixture was not attended by any of the usual symptoms of nitrous-oxide narcosis. G. H. Bailey (London) also strongly supported the claims of nitrous-oxide gas as the best anæsthetic in dental practice.

At a recent meeting of the Odonto-Chirurgical Society of Scotland, Biggs, of Glasgow, ^{May 4} stated that he had carried out a series of experiments in connection with gas and chloroform with very satisfactory results, using from 12 to 24 drops of chloroform in cotton-wool, placed in the tube of the gas-inhaler behind the valve, and then turning on the gas and administering in the usual way. He found the jerky movements of the head to be consider-

ably diminished and the time at the disposal of the operator greatly augmented.

In regard to local anæsthesia, our collaborator, C. R. Illingworth, of Accrington, Eng., believes that the untoward effects of cocaine have, in his opinion, been much underrated. "I have used it extensively in dentistry. My practice is to inject 1 drop of a 4-per-cent. solution into the gum on each aspect of the jaw, and even this small quantity very frequently, indeed, gives rise to faintness, feeble and rapid action of the heart, impeded respiration, pallor, and collapse, with cold and numb extremities. The remedies I have successfully employed for these symptoms are a full dose of liquor ammon. acetatis and a glass of wine. The patient should be placed in the recumbent posture, have all tight clothing loosened, and hot bottles applied to the feet and hands."

Cocaine toothache pellets ⁸²_{Aug 3} :—

R Cocaine hydrochlor.,	. . . . .	gr. 15 (1 gramme).
Opium,	. . . . .	gr. 60 (4 grammes).
Menthol,	. . . . .	gr. 15 (1 gramme).
Althea powd.,	. . . . .	gr. 45 (3 grammes).

Mix and make into a mass with glycerin and gum arabic, and divide into pellets weighing $\frac{1}{2}$ grain (0.032 gramme) each. One of these placed in a hollow, aching tooth will give prompt relief.

Vasili P. Gretchinsky, of Gorodnia,⁷⁴⁵_{No.1} writes that in cases of toothache depending on dental caries he obtains excellent results from plugging the dental cavity with cotton-wool pellets soaked in a 30-per-cent., or even stronger, solution of tannic acid.

Teeth—Reflex Neuroses.—How a small irritation may give rise to the most painful and most widely distributed of reflex neuroses is well illustrated by a case from the practice of a dentist, Herrmann, of Halle.⁸⁰⁴_{No.1; Nov.2} A man of 47 had suffered for twenty years with an intense pain, which began in the frontal region, but afterward involved the whole right side of the face and neck, and ultimately resulted in periodical mental excitement accompanied by delusions. A score of doctors and most varied remedial measures had been ineffectual in affording relief. Finally he sought admission in an asylum, where the physicians hit upon a misplaced wisdom-tooth as the probable cause of the morbid manifestation, and called in a dentist to extract it. In addition to malposition, its roots had large exostoses, as was seen on removal under chloro-

form. A year has now elapsed since the operation, and the patient has been free during this period of all psychical or neurotic disturbance. A case of persistent facial neuralgia due to unerupted cuspid tooth is described by Kirk.¹¹²_{May}

Dental Pathology and Treatment.—Other papers on the teeth which will interest surgeons are "Dental Irregularities in the Native Races," by E. L. Townsend, of Los Angeles, Cal.,⁴⁴_{Jan} in which the author endeavors to disprove the teaching that uncivilized man has perfect teeth; also a contribution by E. S. Talbot, of Chicago,⁸⁰⁵_{July} on "Statistics of Constitutional and Developmental Irregularities of the Jaws and Teeth of Normal, Idiotic, Deaf and Dumb, Blind and Insane Persons," in which it is shown that the latter classes of defective persons are more liable to maxillary deformities and dental irregularities than the healthy or normal class.

"The Care of the Teeth from the Practitioner's Stand-point," by Samuel Sexton, of New York,⁵⁹_{June 1} and the "Surgical Diagnosis of Diseases of the Teeth," by Jonathan Hutchinson, of London,²²_{Apr. 17} are very practical and deserve attentive reading. A statistical study of the development of the wisdom-tooth, by R. Levi,²_{Apr. 21} is published; also "The Oral Cavity in Pregnant Women," by J. S. Marshall, Chicago⁶¹_{Aug. 10}; "The Pits and Fissures of the Enamel," by Andrews, of Chicago.⁶¹_{Aug. 10}

The care of the teeth is discussed by William Caillé, New York¹⁵⁰_{May}; the same subject is cleverly presented by Richter, of Breslau, Germany.⁸⁰⁷_{Nos. 9, 10} The author concludes: "He who advises his patients to clean their teeth in the evening before going to bed; to use oil-soap (pure castile) in whatever form available; to use a solution of peppermint as a mouth-wash; to use silk threads to clean the dental interstices, etc., will deserve the gratitude of his clients and contribute not a little to the permanent preservation of the natural teeth."

The treatment of devitalized teeth is the subject of an interesting paper by A. L. F. Buxbaum,⁵³_{Nov. 9} in which a plea for more thorough antiseptis and more patience in the treatment of these teeth is made.

The transplantation of teeth from one person to another (tooth-grafting) is discussed and illustrated by personal observation in a paper of Kirchhofer, of Lausanne, Switzerland.¹¹⁶_{Aug.} The following case is particularly instructive: A young woman, aged 28, of

healthy parents, had two troublesome incisors extracted, which had been previously filled with gold. They were thrown carelessly in a paper box. Fifty-six hours after this person had been dealt with, a man aged 33 years called at the dentist's office. This patient suffered acutely with periostitis resulting from a fracture of both middle incisors on a level with their necks, caused by falling from a trapeze while exercising in gymnastics. Seeing this, Kirchofer remembered the incisors that he had extracted from the young lady, and, knowing her to be healthy, simply took the teeth from the box and immersed them in a 5-per-cent. solution of carbolic acid. "I extracted then the remnants of the two fractured teeth of the gentleman, and immediately grafted the young lady's teeth in the new sockets. I then tied them to the small incisors and painted the whole affected gum-area with tincture of iodine. The painting I repeated twice a day. On the eighth day they held firmly and spontaneously, the threads having come off. I did not interfere further and allowed the teeth to care for themselves. On the third week the patient could masticate soft bread. At present the grafted teeth are as firm as the others.

The mycological literature of the mouth has been enriched by several notable contributions. Most prominent among these is the book of W. D. Miller, of Berlin,¹¹⁰⁴ and the paper by Gallipe and Vignal.¹⁰⁰
Apr. 2

P. E. Archinard, of New Orleans,⁴
July 8 performed several experiments in the Hygienic Institute of Berlin with the view of testing the antiseptic properties of some mouth-washes, four specimens of those most generally sold in Germany being subjected to bacteriological analysis. The investigation proved these dentifrices to be germ-free, the investigator particularly noting the eucalyptol wash as being especially antiseptic. The liquids examined were: Eau dentifrice du Dr. Pierre, Paris; salicyl. mouth-wash (German make), eucalyptol mund-wasser, and simple mint-water (special manufacture).

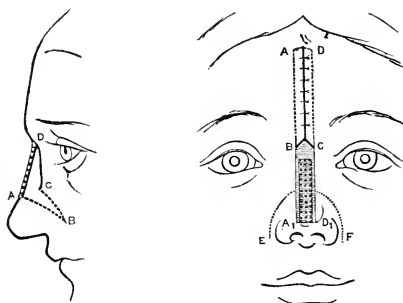
Gallippe and Malassez,⁶⁹
May 23 have found the following mouth-wash most valuable as well as agreeable:—

R. Alcohol,	370 parts.
Carbolic acid,	10 "
Thymol,	5 "
Oil of peppermint,	15 "
Tr. of anise,	100 " —M.

This mixture, which may be colored with a little tincture of cochineal, should be used every morning and evening in conjunction with a "weak" solution of boric acid.

FACIAL SURGERY.

Rhinoplasty.—Several contributions of considerable interest have appeared in the literature of the year, some of them containing new technical suggestions and modifications which will tend to further the progress of this still unsatisfactory field of surgery. These are the papers by J. Rotter, of Munich ³⁴ July 30, Aug. 6; v. Czerwinski, of St. Petersburg ³³⁴ No. 8; by Claude Martin, of Lyons ¹⁰⁷⁷; by Daniel Mollière, of Lyons ¹⁰⁰ Mar. 2; an unusual case of facial prosthesis, by Chas.



FIGS. 1 AND 2.—FLAPS IN ROTTER'S OPERATION.
(*München Mediz. Wochenschrift*.)

A. Hayman ⁸ Jan. 26; and a paper on plasto-cosmetics in surgery of the face, by B. Merrill Ricketts, of Cincinnati. ⁵³ Sept. 21

The paper of Rotter is notable as a demonstration in favor of König's method of rhinoplasty, which consists in borrowing from the forehead a flap consisting of skin, periosteum, and a thin slice of bone. This method, which has been slightly modified by Israel, of Berlin, is again modified by Rotter,—not in principle, but in the method of utilizing the flaps. He has applied König's method to the correction of pug-nose (see accompanying Figs. 3 and 4) and in the complete restoration of the organ when destroyed by lupus and syphilis. A König osteo-periosteal-dermal flap is brought down from the forehead, its osseous raw surface fixed below to the nose and made to look upward (Figs. 1 and 2). The raw surface is

covered by lateral flaps liberated by semicircular incision over the alæ nasi.

While not always successful from the æsthetic stand-point in the latter instances, still he has shown that, in spite of its manifest difficulties and disadvantages, there is some merit in the König solid flap, especially as in Rotter's cases a preliminary bony framework is made first and then covered over by lateral or other simple cutaneous flaps.

As the support of a firm septum is the most difficult point to realize, it appears to us that the following modification suggested



FIG. 3.—BEFORE OPERATION.



FIG. 4.—AFTER OPERATION.

(*München Mediz. Wochenschrift*.)

by v. Czerwinski,³³⁶ while not yet tried clinically, will commend itself to the surgeon as more practical and advantageous, from all stand-points, than the rather clumsy and difficult König flap. "From the soft parts of the forehead, including the periosteum, a long, oval-shaped flap is formed, the pedicle of which is formed exactly as in the old operation. When the flap is loosened, it is doubled in the middle upon itself so that its point is folded against the pedicle, and the two periosteal surfaces constituting its posterior surface are brought together. The flap, by this doubling, receives the shape of an isosceles triangle, the upper base of which corresponds to the place where the flap is bent upon itself, and the point

to the pedicle. The periosteal flaps are sutured and allowed to become adherent, when the operation is completed by raising the cartilaginous portion of the nose. This completes the septum, and by a subsequent step the alæ, or nose-covering proper, is formed by the transplantation of frontal or cheek flaps.

Ricketts,⁵³_{Sept. 21} in his review of plasto-cosmetics, rightly insists upon the advantages of Sabine's operation, which consists in transplanting the little finger to the nose. This operation, which may be called the American operation, is as good as if not better than any other of the several autoplasmic methods proposed. It should be known and appreciated better abroad, though in England it has already been tried in the clinics of at least one surgeon, Hardy, of Manchester. Interesting details concerning a hitherto unpublished case, in which the originator of this method, Sabine, of New York, operated, are given by Howe in the Proceedings of the New York Academy of Medicine.¹_{Sept. 21}

In the preceding contributions we remark the efforts made by surgeons to improve the technique of rhinoplasty by utilizing solely the flap material furnished by the patient; we now desire to call the attention of the reader to the correction of nasal deformities by the substitution of foreign materials for the tissues, *i.e.*, the purely artificial nose, and the combination of both an extraneous metallic support with an autoplasmic flap.

While mainly dealing with the immediate correction of the deformities which result from the resection of the lower jaw, Martin¹⁰⁷⁷ describes his method's experience in rhinoplasty. He has been thoroughly successful as well as original, if we are to judge from the confirmation and praise which he has received from Ollier, Poncet, Létiévant, Gayet, Pollosson, and others.

As stated above, the great *desideratum* in rhinoplasty is a firm, resisting, and lasting frame-work. The laborious efforts of Rotter and the paper of Czerwinski sufficiently attest this, and prove that, notwithstanding all the ingenuity and constant endeavors of the ablest workers, the results are still unsatisfactory. Martin appears to have solved the problem. He first constructs a metallic frame-work, and fixes it by sharp points into the bone which surrounds the loss of substance; this frame-work is now prepared to be covered with the surgeon's skin-flap, which he may borrow from wherever he chooses. The operation presents no special difficulties;

but what is the first result? Is the metallic frame-work permanently supported by the tissues? "Yes," says Pollosson, who bears witness to the success of Martin's operation in several of his own cases, "provided that care is taken to prevent tension of the flaps, and that none of the ordinary complications in such cases do not compromise their vitality." After detailing some very interesting cases in which it is shown that the apparatus has been perfectly supported for years, Pollosson regards it as a fact at present established that autoplasty on a prothetic base, as applied to rhino-plasty, has given very happy results. The foreign body is well supported by the tissues and answers admirably its supporting function. It is true that in rhino-plasty the mechanical conditions are particularly favorable to the maintenance of the apparatus. The cicatricial retraction of the posterior surface of the flap tends only to improve the appearance and to fix the apparatus more securely in the tissues; therefore, the cicatricial contraction, which in other localities would tend to expel the foreign body, in rhino-plasty would, on the contrary, tend to fix it and to establish the prothetic appliance as a permanent fixture.

As an illustration of what modern prothetic ingenuity can accomplish in the most trying and apparently insurmountable cases, we append the following illustration, which shows a patient who was operated upon by Henry Morris for a large recurrent myeloid sarcoma of the face. The appearance of the patient after operation is shown in Fig. 5. The absence of a great part of the soft palate rendered speech difficult and almost unintelligible. His case at this stage was undertaken by Chas. A. Hayman, of Bristol, Eng., who has supplied him with an artificial cheek, eye, and palate, by which he is enabled to speak intelligibly, and which has improved his appearance as seen in Fig. 6. Hayman obtained a model of the mouth, after which an ordinary plate was made, then a special obturator to correct the palatine defect. "With the obturator in position, a model of the remaining hollow was taken, and from this a silver plate was struck which filled accurately into the hollow and under the right ala of the nose; a small tongue of silver was adjusted over the bridge of the nose, and on to this the spectacles were subsequently soldered. An artificial cheek and eye were then modeled in wax to match the other side of the face. A second silver plate was struck upon a metal cast taken from the

model, and soldered to the inner plate as a cover is fixed to a box. An artificial eye was then fixed to the plate in the proper situation, and the face painted flesh-color and japanned. In order to keep the mask in position, a strong wire, fixed to the posterior edge of the artificial cheek, passes around the right ear, and the ear-pieces of the spectacles are joined behind the head by an elastic band."

Cheeks.—An article on the lipomas of Bichat's lump (fat mass between buccinator and masseter) is contributed by François Villar.⁷
No 23



FIG. 5.—BEFORE PROTHESIS, AFTER REMOVAL OF MYELOID SARCOMA.
(*British Medical Journal*.)

A curious melanotic sarcoma of the cheek, associated with extremely black melanotic spots on the cheek, is reported by Larmarque.¹⁸⁸
Dec. 30, '88 A large enchondroma of the cheek, of forty years' standing, in a woman of 90, is reported by C. H. Welch.²
Mar. 16 The tumor weighed from 4 to 5 pounds (2 to 2.500 kilogrammes), and measures 16 by 13½ inches (0.40 to 0.34 centimetre); not operated.

Wölfler¹¹³
Apr. 23 discusses meloplasty for cicatricial contraction following noma, and reviews the methods of Gussenbauer, Israel, and Kraske. He failed in one case after attempting to correct the rigidity and deformity by transplanting an intra-buccal mucous flap.

Lips.—Thomas H. Manly¹_{June 15} reports a case of harelip and cleft palate, operated upon successfully seven days after birth. The author urges strongly the “immediate operation,” as he calls it, *i.e.*, within ten days after birth. While he judiciously guards against laying down an iron rule, he believes that: “1. If the child is strong and well fed, it is a favorable case for early interference. 2. If the cleft is confined to the skin and flesh tissues alone and is of considerable extent, then wait (if the child is nursing) till weaned. 3. Always operate as early as possible if the fissure



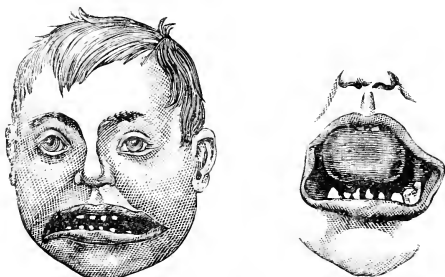
Fig. 6.—AFTER PROTHESIS. HAYMAN'S CASE OF FACIAL PROTHESIS. ARTIFICIAL CHEEK, EYE, AND PALATE.
(*British Medical Journal.*)

extends into bony structure. Under these circumstances do not delay on the score of health, for feeble-looking infants bear cutting operations better than those that are fat.” Manly models and approximates the edges of the bony fissure with the hand, which he uses as an osteoclast. For the harelip he always prefers Maurice Collis's operation,¹¹⁰⁰₁₀₆ in which all wasteful paring of the edges is avoided, the edges being simply split and the raw surfaces thus produced approximated.

A. and F. Suarez de Mendoza⁶⁷_{Aug., '33} ⁶⁴_{Dec., '36} contribute a valuable paper on complicated harelip, and, after a considerable experience,

arrive at the following conclusions: (1) in simple cases, the child, being in good health, should be operated upon early; (2) in more complete and complicated cases, if the naso-buccal fissure prevents suckling, operate without delay; (3) in simple cases in which suckling is possible, temporizing is permissible; (4) in all cases in which the correction of the harelip is attempted, it is indispensable to success to secure the absolute freedom from tension of the flaps when they are approximated.

A median harelip in a boy, aged 5 months, was exhibited by Bernard Pitts⁶_{Mar. 23} at the London Medical Society. The cleft was quite median, extending half-way to the nose; the premaxilla was centrally grooved, but the bone was otherwise perfect. No cleft palate. This condition is extremely rare; indeed, Dupuytren



FIGS. 7 AND 8.—MACROSTOMA.
(*Wiener Klinische Wochenschrift*.)

and Fergusson denied its possibility. Bland Sutton⁶_{Feb. 18} has described a case in which the premaxilla was absent.

A case of macrostoma operated upon by Billroth is reported by E. Pilz⁸_{June 27} (see Figs. 7 and 8), who adds a brief synopsis of 12 cases representing the different varieties of this congenital defect. This summarizes the list of recorded cases. The cause of the defect is attributed to amniotic bands.

J. Dreier²²⁶_{B. 32, p. 269} reports a rare case of extensive oblique fissure of the face. A girl 2 days old was brought to the Bremen Infirmary. Besides presenting a double-cleft foot, she had an extensive fissure of the right cheek, which was continuous with a fissure which split the left lip, upper jaw, and palate, and extended around the back of the head till it met the fissure of the right cheek. Nearly

everywhere along the extensive cleft shreds of amniotic membrane could be seen hanging from and adherent to the borders of the indentation. The midwife stated that during the confinement the adherent amnion had to be torn and cut away from the child's head. The child died six weeks after birth. Bergmann, Roser, and Madelung⁴_{Dec. 3, '88} discussed the etiology of such congenital fissures.

A plastic operation for restoring the free border of the lower lip, after the removal of epitheliomata, as performed by Tripier, of Lyons, is described in detail by Imbert.⁹¹_{Apr.} In this operation the lip is refashioned by means of mucous strip taken from the inner surface of the lip, left attached by its two extremities, and slipped into place so as to restore the normal appearance and thickness of the lip. Antisepsis is aimed at by scrupulous cleanliness of the mouth and teeth, etc. The tumor having been removed, the lip is everted, the mucous strip freed by means of a bistoury or tenotome and slid forward into place. The strip is fixed in its new place by points of suture. A strip of iodoform gauze is placed between the lips and gums. Since 1883 this procedure has been adopted in 46 cases. The first 2 were unsuccessful on account of partial mortification of the strips; 2 others failed on account of return of the disease. The other 42 were successful.

An article by W. Roger Williams,²²_{May}, on cancer of the lips, consists essentially of a series of numerical conclusions based on fixed data, from which we quote as follows: Relative frequency of 15,481 neoplasms consecutively under treatment at Middlesex, University College, St. Bartholomew's, and St. Thomas's Hospitals, London, during the last sixteen to twenty-one years, 352, or 22 per cent., originated on the lip. "The relative frequency of the neoplastic process in its other chief seats I have found to be as follows: uterus, 17 per cent.; breast, 15 per cent.; skin, 8.4 per cent.; connective tissue, 6.2 per cent.; tongue and mouth, 5.6 per cent.; ovary, 5.2 per cent.; external genitals, 4.6 per cent.; bones, 3.6 per cent.; rectum, 3 per cent.; maxillæ, 2.6 per cent.; stomach, 2.3 per cent.; all others, 24.3 per cent."

Of these 352 lip neoplasms 340 started from the lower lip, thus: epithelioma, 329 (326 males, 3 females); papilloma, 7 (4 males, 3 females); angioma, 3 (2 males); and cystoma, 1 (male).

Only 12 originated in the upper lip, viz.: epithelioma, 3 (1 male,

2 females); sarcoma, 4 (2 males, 2 females); angioma, 3 (1 male, 2 females); papilloma, 1 (female); and fibroma, 1 (female).

The author then carefully draws an analytical summary of 100 cases of epithelioma of the lower lip in males, in which the age, total duration of life, duration of life subsequent to the excision of the primary disease, the original seat of the disease, the mode of origin, civil state, occupation, etiology, previous health, family history, primary or recurrent growths, state on admission, and the *treatment* and *results* are carefully considered. Under this last heading it is stated that the disease was excised in 64 *primary* cases, with but a single death. In 51 cases the lymphatics were not touched. All of these recovered. The average duration of their stay in hospital was eighteen days. In the other 13 cases glands were dissected out as well; the single fatal case belongs to this group. The average period of their convalescence, twenty days. There were twenty operations for recurrent disease without a single death. In 11 of these cases glands were dissected out. The average duration of their stay in the hospital was forty-six days. The average period of convalescence of 9 other cases, in which no glands were removed, was fifteen days. The causes of death in 12 other cases were as follow: asthenia in 8, œdema of glottis in 2, hæmorrhage in 1, and cystitis with suppurative nephritis in 1. The results of the necropsies are also specified in detail.

L. Eschweiler, of Cologne, ³⁰¹_{B. 29, p. 357} has collected the cases of carcinoma of the upper lip strewn in literature and analyzed them. To 28 cases gathered from the various sources Eschweiler adds 4 taken from the surgical clinic at Strasburg. The proportion between carcinomata of the upper and lower lip oscillates between 1 to 25.5 and 1 to 12. The male sex preponderates in carcinoma of the upper lip as in that of the lower. Traumatism once and lupus twice appeared to be the only precancerous conditions recorded. Eschweiler, like Trendelenburg, draws attention to the fact that lesions involving a loss of the protective epidermis are commonly mentioned in all alleged causes.

K. Gumpertz, of Berlin, ³³⁶_{Aug. 24} discusses in a statistical manner the clinical features of carcinoma of the lip. The statistics are collected from the clinic of the Augusta Hospital, Berlin, 1876 to 1887. The ages vary from 26 to 77. Average duration of dis-

ease from the first appearance to operation, thirteen months. Of 37 patients operated in 1879, 13 appear to have been cured permanently (35 per cent.). Of 32 primary operations, 9 recurrences and deaths; 7 cured permanently; 2 died after the operation; 14 secondary operations after first recurrence (average return, one year, ten months after first operation), of which 7 died; after second post-operative recurrence, 4 were cured. In 7 secondary recurrences (5 of which died with third recurrence) the average time that elapses after first recurrence is three and one-half months. In 1 case operated after a third recurrence death followed after four and a half months. Duration of the disease, as estimated in 13 cases, nearly three years.

A. F. Plicque, Paris.¹⁰⁰_{Sept. 7} carefully reviews the surgical treatment of epithelioma of the lips in its latest aspect. He is very conservative in his estimate of Koch's operation for the removal of the lower lip, in which the whole submental and part of submaxillary lymphatics are excised, whether apparently diseased or not. This extensive operation, which is similar to that of Gross for the removal of the female cancerous mamma, he would restrict to young or vigorous subjects only.

Tongue—Malignant Disease.—The papers on this subject that attracted the greatest attention during the year were both read at the last Congress of German Surgeons, held April 24th and 27th: the first, on the etiology and diagnosis of labial and lingual carcinoma, by von Esmarch, of Kiel⁶⁹_{No. 18}; on prognosis and treatment, by Fedor Krause.⁶⁹_{No. 22} Esmarch called attention to the many mistakes that had been made in the removal of parts, often of great importance under a diagnosis of malignancy, when the disease afterward proved to be syphilitic, or even merely inflammatory. He thought that many syphilomata had been removed as sarcomata.

In cases in which repeated examinations gave a negative result a suspicion of syphilis was justifiable, and in such cases antisiphilitic treatment could be introduced. He had seen many cases of muscular sarcoma disappear, and had become convinced that in most cases—perhaps in all cases—of sarcoma of muscle the tumor was really syphiloma; antisiphilitic treatment could decide the diagnosis, but it must be steadily persevered in for months. In cases in which potassium iodide was not efficient, inunction, infusions, arsenic, would effect removal of the supposed sarcoma.

He had proposed the following method in all tumors of the tongue and lips: Where the microscope showed epithelial cancer in the part scraped and excised, to proceed at once to extirpate the tongue and the parts around; if tubercle bacilli were found imbedded in the connective tissue, to scrape out the accompanying ulcers and apply the cautery; if the fungus of actino-mycosis were found, to scrape out and apply sublimate gauze; if spindle-cells were found, first to suspect a syphiloma and to commence energetic antisyphilitic treatment. The microscope should be used from time to time, as a syphiloma could be converted into cancer.

If a syphiloma were excised by mistake it would quickly recur, and, finally, general marasmus would terminate the scene. The distinguishing characteristics of malignancy were the disposition to rapid growth, the recurrence of the tumor, the accompanying affection of the lymphatics, metastases, and, finally, incurability; but the anatomical appearances did not permit of a certain conclusion as to malignancy. The course of cases of tuberculosis was extraordinarily various; sometimes they remain superficial for years, and in others, even after careful clearance of the diseased parts, great destruction of tissue takes place and rapid return.

The prognosis and treatment of cancer, as discussed by Fedor Krause, is based on a study of 91 cases of tongue-cancer which have been operated upon at Volkmann's clinic at Halle. Of these 91 cases there were but 2 deaths which could be traced immediately to the operation, nor were either of these due to extension of inflammatory processes to the neck and mediastinum. This is in striking contrast not only to the figures of Billroth, whose mortality is 22.5 per cent., but even to those of Kocher, who, by preparatory tracheotomy and tamponade, reduced his mortality to 7 per cent. Volkmann avoids preparatory tracheotomy and tamponade, as being in itself an element of danger and needlessly complicating the operation; nor does Krause admit that splitting of the cheek is of the slightest service, the room gained by this procedure never being of sufficient importance to justify the incision.

Krause operates with scissors and knives, and employs but two methods; the choice of these depends upon the position, size, and extent of the growth. If, by means of tenacula and strong

wire passed through the tongue, the growth can be drawn to or beyond the dental arch, a resection is made by means of a knife or scissors. The patient being seated upright in a chair, the blood flows away from the pharynx, and is in no danger of being drawn into the lungs. After the bleeding is checked, the mucous membrane can at once be brought together, or, if there is a long strip of healthy tongue left, this can be brought around so that a short but broad organ is left. If the carcinoma extends so far posteriorly that strong traction is not sufficient to bring it near the dental arch, or if it has involved the floor of the mouth or tonsils, then the parts can best be exposed by dividing laterally the submaxillary bone.

The patient is placed upon a table in an almost sitting posture; a traction-thread is passed through the tongue, and the latter is drawn forcibly forward. The lower canine or first molar tooth is then drawn, after which an incision is carried directly downward from the corner of the mouth to the larynx, dividing the periosteum of the lower jaw, but made much more superficial in the neck. The periosteum, on the inner surface of the lower jaw, is now pushed aside sufficiently to allow a broad iron lever to be passed upward till it rests upon and protects the upper lip. The jaw is divided upon this lever by a thin, broad-bladed amputation-saw, cutting obliquely backward; a strong resection-hook is placed in each opening of the exposed infra-maxillary canal; the two portions of bone are drawn forcibly apart, and the soft parts of the mouth are divided on a line with the first incision. Sufficient room is given for readily securing all bleeding vessels. The palato-glossal fold is divided, and a drainage-tube the size of the little finger is placed in the tonsillar fossa and curved to the lower portion of the neck incision. Thirty-five operations performed in this way gave but 1 death, due to lobular pneumonia.

In completing the operation the fresh surfaces should be covered by mucous membrane, as far as this is possible, and the bone should be held together by silver wire. Frequently the sawed surfaces of bone perish, thus delaying healing; but this is never a serious complication. The after-treatment consists in keeping the patient in a half-reclining posture, giving him liquid diet by means of a long glass tube extending far back into the mouth, and carefully irrigating the oral cavity after each meal with a 3-per-cent. boracic-acid solution.

As far as recidivity is concerned, it must be conceded that the prognosis of cancer of the tongue is particularly bad. Of 29 cases operated upon by the second method (consequently the most serious cases) 1 is still living (6 years), and with no return of trouble; 1 remained free from relapse for a whole year; he finally perished, three years after the operation, from a return of the disease. The average period of life after operation was one year.

Of 37 partial tongue extirpations without section of the maxilla, 3 have survived, without relapse, for more than three years after the operation. The diagnosis of all these cases was confirmed by careful and skilled microscopic examination.

E. Anders,²¹ Jan. 28, Feb. 4 after describing a case of extirpation of the tongue, operated upon by the Regnoli-Billroth method, in which no recurrence had followed nine months after the operation, discusses the relative value of complete extirpation through the floor of the mouth and complete extirpation complicated with section of the inferior maxillary, as in the Volkmann method, just described. While the author admits the inadequacy of the present statistics, he still regards it as significant that in cases collected by Schlapfer, in which the tongue was removed by infra-maxillary incision without section of the lower jaw, the mortality was 2 out of 30 cases, while in those complicated by section of the lower maxilla the mortality stood 9 out of 20. In Ander's synopsis we also find that in 20 cases operated with section of the jaw 10 died. These results, so much in contrast with those of Krause, are worth noting.

Butlin,² Apr. 6 in discussing the precancerous conditions of the tongue in the Harveian Medical Society of London, among other interesting statements, said that in 70 per cent. of cases of cancer of the tongue a precancerous condition usually preceded the final manifestations. Warty growths were the most certain precursors. Several debaters believed in assuming the aggressive in the precancerous stage.

Apropos of the precancerous condition of the tongue, the following is quoted from one of Garretson's clinical lectures⁸⁰⁸ on *leucoplakia buccalis*: "Here is a case of leucoplakia buccalis in a man of some 47 years of age, whom I have had before you several times within the last year. This is a peculiar disease,—you might almost say an anomalous one; one that occupies, I believe, the border-land between malignant and non-malignant growths. Some

call it ichthyosis of the mouth, some psoriasis, some eczema; others, other names. This diversity of naming is chiefly because the malady is so obscure, and in different instances simulates the different appearances of these different affections. I call it leucoplakia buccalis because its chief manifestation is that of white plaques or patches on the inner oral buccal surface. In the course of my specialty as an oral surgeon I have seen more cases of this trouble than fall to the lot of ordinary surgeons, and I have learned by experience—by sad experience—the folly and harm of using radical measures,—of trying to burn out the affected parts with caustics. It is like striking with a wand a sleeping, hungry tiger. The hitherto quiescent and sluggish spot takes upon itself a swift and terrible growth. The temptation is now to use more caustics, and the effect is simply to spur on the disease, now truly malignant, to increased efforts at sapping the patient's life. This is a malady which beautifully illustrates our maxim of 'when you know not what to do, do nothing.'

"There are few people, though, who, having a certain trouble, will submit to a course of doing nothing; but if I had this case of leucoplakia buccalis in my own mouth I should follow the same treatment which I have advised this man to pursue,—simply to use a wash of subnitrate of bismuth. By acting on this advice the patient may live as long as any of us, and finally come to his end by some other cause; but if he allows the parts to be tormented by caustics, the course of his life will be suddenly and sadly changed."

Barwell,²_{Mar. 3} in an article on cancer of the tongue and its removal, thus describes his method of excision: "When the usual precautions for keeping the mouth open and for drawing forward the tongue are taken, the head being held strictly straight and thrown slightly back, the surgeon feels for the hyoid bone, immediately in front of which he makes an incision about $\frac{3}{8}$ inch (0.009 metre) long exactly in the middle line, and with the edge of the scalpel directly forward. This incision exposes the raphe of the mylo-hyoid, which is divided; the genio-hyoid and genio-hyoglossi are separated. Now a Liston needle, armed with ligature silk, is passed into the wound, carried on the left side beneath the mucous membrane, through which it is thrust on a level with or behind the last molar tooth; in withdrawing the needle one end of the silk is

left in the mouth. Another armed needle is now passed on the right side in the same way, save that the loop is left in the mouth. The *écraseur* wire, with its end sharply bent into a hook, is tied to the first-named piece of silk,—that is to say, to the end of it, which hangs out of the supra-hyoid wound. There has been cast around the tongue, as far back as one will, the loop of the *écraseur*; but to prevent any chance of slipping forward I use as a guide an instrument rather larger than an eyeless Liston needle, which I pass into the wound, through the middle line of the tongue, guiding it in any chosen direction by my left forefinger, placed on the tongue at the spot selected. This instrument an assistant steadily holds, while the surgeon, holding the *écraseur* screw, separates the tongue posteriorly. As soon as the wire comes out of the supra-hyoid wound, the loop of another *écraseur* is pressed well down in the incision just made, and being set to work completes the separation of the tongue, which is taken out from between the teeth.” The author has used this method exclusively for eight years.

“A simple method of securing the lingual artery during the operation of excision of the tongue with the scissors” is described by F. B. Jessett.²_{Feb. 16} This operation is only applicable when the disease is limited to the tongue itself, and when the floor of the mouth is free. The tongue being drawn well out of the mouth, the frænum and mucous membrane of the floor of the mouth around the half or whole of the tongue, if the entire organ is to be removed, is divided in the ordinary way with scissors slightly curved upon the flat. The tongue next being drawn well forward and upward, a few fibres of the genio-hyoglossi muscles are divided and torn through deeply with the finger. An ordinary aneurism-needle, threaded with No. 4 Chinese silk, is thrust deeply down between the two genio-hyoglossi muscles, the point being directed downward and backward, until it is opposite the second molar tooth. The point is then turned outward and brought out of the incision previously made through the mucous membrane, unthreaded, and withdrawn. The ligature was next tied firmly and as deeply as possible. A pair of clamp-forceps, somewhat larger than those in ordinary use, were passed down and made to catch the tissues on the distal side of the ligature, to prevent the possibility of the ligature being snipped as the tongue was being removed. If it was desired to remove the whole tongue, the same

manœuvre was carried out and the artery on the other side secured.

At the Congress of French Surgeons, ³_{Oct.16} held October 7th to 13th, Léon Labbé presented a patient, male, upon whom he had operated eleven months previously for a very extensive epithelioma of the base of the tongue and inferior portion of fauces. This served to illustrate Labbé's teaching, which inculcates that in extensive neoplasms of the base of tongue, tonsils, and palate it is necessary to resect part of the lower jaw in order to gain ready and safe access to the deeper portions of the mouth. A more extensive case of malignant disease of tongue, left tonsil, and veil of palate, with partial resection of the lower jaw, is reported by Le Bec. ¹⁰⁰_{Oct.8} In this instance preliminary tracheotomy was performed and the mouth stuffed with iodoform gauze, the patient being fed by a naso-pharyngeal tube. Death took place eight days after operation from pneumonia.

An interesting case of *double epithelioma* of the tongue (double tumors are rare) is reported by Voituriez, of Lille ²²⁹_{May 17}; also an epithelioma of the tongue, recognized by means of Warren's punch-trocar, which removed sufficient tissue for microscopical examination by J. C. Warren, Boston ⁹⁹_{Feb.14}; a *giant-celled sarcoma* of tongue, by F. Fergusson, presented to the New York Pathological Society, ⁵⁹_{Aug.31}—a rare specimen. Lydston, of Chicago, ⁵⁹_{Oct.26} also reported a rather unique case to the Mississippi Valley Medical Association, September 10th to 12th, in which it was conclusively demonstrated that a *syphilitic* had been *transformed* into a *sarcomatous process*. Cases of transformation of syphiloma into epithelioma are well known, but into sarcoma, rarely, if ever. In this case recurrence and death followed amputation of tongue.

Tuberculosis of Tongue.—Numerous cases of this affection of the tongue have been reported during the year. Leloir, of Lille, ⁷³_{Aug.1} reports an undoubted case of lupus of the tongue; confirmed by inoculation. Pulido, of Madrid, our corresponding editor, reports another case in a phthisical patient treated in the Service of Mariani, Princessa Hospital. C. E. Bean ¹_{Sept.7} reports 2 cases, also in phthisical patients. W. T. Bull ⁵⁹_{Jan.19} presented to the surgical section of the New York Academy of Medicine a patient, aged 30, who had been operated on three years previously for tuberculosis of the tongue, mistaken at the time for carcinoma,

Kocher's operation being performed. The wound healed in six weeks, food and drink being swallowed with entire ease.

Weir, who presided at the meeting, remarked that in 5 out of 7 cases in which he had known that the tongue had been extirpated for tuberculosis, there had been a recurrence in remaining tissue, despite great thoroughness in the operation.

Non-malignant Tumors of the Tongue.—Kirchoff⁶⁹_{No. 23} reports 2 cases illustrative of the subject: one, a neoplasm of the size of a bean on the back of the tongue, which, after extirpation, was found to be a fibroma; the other, a patient aged 62, who had been troubled with a tumor at the base of the tongue the size of an egg; it was a lipoma, and was extirpated. Kirchoff passes in review the clinical peculiarities of lingual lipoma, fibroma, papilloma, keloid, and adenoma; osteoma and enchondroma, when they do occur, being simple degenerative features of fibroid degeneration. The vascular tumors and parasitic cysts are also considered.

In view of the difficulties which frequently occur in the clinical differentiation of these lingual tumors, the editor would here suggest this as an excellent field for the liberal and frequent application of Warren's trocar-punch, which will allow the surgeon, when in doubt, to remove sufficient tissue for histological examination.

Our corresponding editor, G. Somma, of Naples, reports that J. Perrando⁷⁶²_{No. 5} has observed a case of *congenital* lipoma of the tongue. This is the second case of the kind recorded in literature. Other localized multiple lipomatous deposits existed in the body of the same child.

Our corresponding editor, Gouguenheim, of Paris, also communicates an interesting case reported by Vincent, of Lyons,²¹¹_{Jan. 27} in which a tumor of the tongue was observed in a newborn child. The tumor rested upon the tongue and was attached to it by a pedicle. It was a fibroma, and caused the child to look as if it had two tongues.

Interesting cases of acute abscess of the tongue are reported by Wharton, of Philadelphia,¹¹²_{July} one by Fleischmann, of Albany,²¹⁶_{Sept.} and one in an editorial.¹_{Nov. 16}

A case of congenital macroglossa, with true general muscular hypertrophy and idiocy, is carefully studied by Franz Bruck, of Berlin.⁶⁹_{Mar. 21}

Hypertrophy of the follicular glands in posterior dorsum of tongue is the subject of an interesting and instructive paper by J. Herzog, of Steiermark.⁸¹ Feb. 21 The symptoms of the affection are: Sensation of foreign body in throat, empty and painful deglutition, irritation, cough, dyspnoea, fatigue of voice. The follicles situated about the papillae vallatæ and sinus epiglotticus are much swollen and red. Treatment: topical application of argenti nitras and iodine.

Palate.—Judging by the numerous contributions that have appeared in the most active and representative centres of surgical work, it would appear that we are on the eve of a general revival in favor of the operative treatment of cleft palate as contrasted with its mechanical treatment.

The Suffolk District Medical Society held an interesting meeting January 2d, which was devoted to the treatment of fissures of the palate.⁹⁹ Feb. 23

The question, "Is Staphylorraphy Preferable to Mechanical Treatment?" was discussed by Chas. B. Porter. The views of the author are as follow: "It seems to me that the time has come when surgeons should review the subject, and try to arrive afresh at a conclusion as to whether a mechanical appliance—a thing which must be removed often to preserve cleanliness and occasionally renewed—is a worthy substitute for staphylorraphy in all or a majority of cases. Certainly, among the poor, who can ill afford the expense of an obturator, an operation is desirable, if successful only so far as to close the cleft and save the nasal fossæ from invasion of particles of food three or more times a day."

Two cases are reported, one successful (female, aged 16), treated with an immediate post-operative and protecting diaphragm, which the author rightly regards as one of the most valuable recent additions to the surgical treatment of these cases. For this reason Porter believes that the operation should be postponed to the time when there are teeth enough in the jaws, to which a diaphragm may be fastened, to protect the wound from the pressure of the tongue in swallowing, which is often the cause of failure.

The mechanical treatment of cleft palate was discussed in two separate papers by G. F. Grant, and H. A. Baker.⁹⁹ Feb. 23

Since 1871 Grant has treated 115 cases of congenital fissure, with the results justifying the conclusion that there is no reasonable

doubt as to the success of the mechanical appliances. After the use of the appliance the whole system of speech is so changed that it is always retained, even on removal of the appliance, and thus the patient can form his words better than he did before he had the appliance introduced. According to his experience, the appliance can be adjusted with success as early as the seventh year.

In 1881 Baker made his first successful appliance, and since that time has treated upward of 100 cases. He has invented a special obturator, made of hard rubber, with hinges to aid the levator muscles, and which, from the author's reports, has many advantages over similar contrivances.

J. C. Warren believed in the advisability of the operation in which sufficient soft parts were available for the purpose of closing the opening. His father, Masson Warren, a noted American pioneer in this field of surgery, had operated on over 100 cases.

At the meeting of the Imperial Society of Physicians of Vienna, held March 15th, Billroth ¹¹³_{Mar. 17} showed 4 patients on whom he had performed staphylorraphy and uranoplasty by a new method, at one sitting, with much success. Uranoplasty has been introduced into surgery by von Langenbeck, and Billroth has modified the procedure to meet the following conditions: The nasal was shut off from the pharyngeal cavity during speech not only by the application of the soft palate to the posterior wall of the pharynx, but by the action of a circular muscle the anterior part of which was contained in the velum. This muscle acted as a sort of sphincter, and the results hitherto obtained in operation for defects in the soft and the hard palate were not quite satisfactory, owing to the fact that the sphincter was cut through when it was divided. In cases of extensive cleft palate there was a congenital defect not only in the bone, but also in the sphincter of the velum; and if the remaining portion of this muscle was cut through, occlusion became impossible and speech was much impaired. Billroth therefore only divided the mucous membrane at the side of the velum, and approximated the internal wings of the sphenoid to each other by means of the chisel. The mucous membrane was utilized to cover the defect, and the sphincter remained intact.

Julius Wolff, whose special work and success in the field of palatine surgery is well known, has contributed three papers during the course of the year which are quite valuable to specialists. In

the first paper, which was read before the German Surgical Congress of 1888,²²⁶_{E.38} he reports an unusually severe case of cleft palate and harelip. The opening in the lips was very wide, the edges being fully $\frac{1}{2}$ inch wide (0.013 metre) apart from each other; the alveolar process, as well as the velum and uvula, were completely divided. Two days after the birth of the child Wolff operated upon the harelip, and a little later transplanted the left wing of the nose, which had been drawn to one side by the harelip, to its natural position. This gave both nostrils a normal appearance. When the child was 5 months old the uranoplastic operation and staphylorraphy was performed. The wound healed well and by first intention. Complete recovery soon followed.

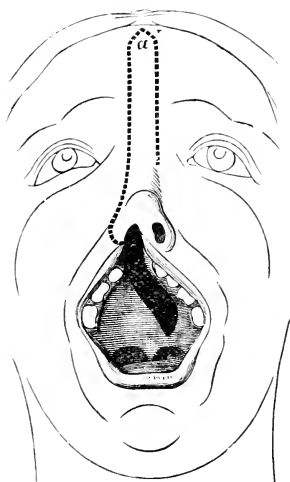
Wolff argues that the mortality attending operation of cleft palate in young children would be considerably lessened if the operation were performed when the child was a few months old, if greater care were taken to avoid even the slightest hæmorrhage, and if the operation were done in successive stages, performing one portion of it in one day and waiting from five to eight days before performing the next. The child in question had no less than six operations. During the entire treatment there was no fever nor any loss of appetite. In conclusion, Wolff says that in operating by this gradual method the probabilities of healing by first intention are greatly increased.

In the second paper, on "The Functional Success after the Operation for Congenital Fissure of the Palate,"⁴_{Mar.4} a powerful appeal in behalf of increased surgical interference in cases of congenital defect is made by Wolff. The history of surgical opinion in Germany is reviewed and the advantages of the plastic result over the mechanical appliance emphasized; finally, the post-operative treatment for the correction of the speech troubles, especially in adults, are well considered.

In this paper, while considering the probabilities of success after operative treatment, Wolff states that the last 5 cases he has operated upon, mostly very young children, were all successful by operating at one sitting (*in einem Zuge*) throughout the whole extent of the cleft. The operation was performed upon children aged, respectively, 7 years, 3 years, 2 at $1\frac{1}{4}$ years, and 1 at 3 months. The last case was operated on November 5, 1888, and was discharged from his clinic sixteen days later with a palate

beautifully united to the tip of the uvula, the child gaining 1 pound (500 grammes) in weight before leaving the clinic. This case, besides the one previously reported in a child of 5 months, has convinced Wolff that it is the duty of surgeons to operate as soon as possible after birth, in order to lessen the mortality of children born with this dangerous defect.

In the last contribution Wolff⁴ June 24 simply confirms his remarkable success in the treatment of cleft palate by reporting and presenting 3 cases that he had operated upon at the meeting of the Hufeland Medical Society, held March 16th. One of the cases was the infant reported in preceding paper, now 9 months old. The child was strong and well nourished. The other 2 cases were, one, an adult female suffering with an acquired defect of roof of mouth, resulting from removal of floor of antrum, and the other, a grown female child suffering from complete cleft palate, only aggravated by the failure of preceding operations. This case was cured after several sittings

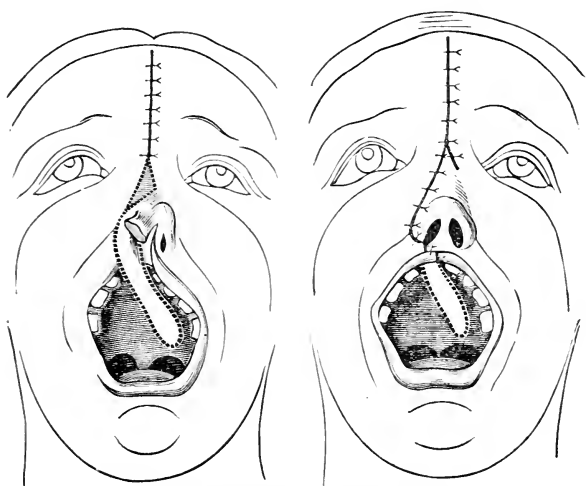


ROTTER'S OPERATION FOR CLEFT
PALATE.
(*Münchener Medicinische Wochensch.*)

Rotter, of Munich,³⁴ July 30, Aug. 6 contributes a most interesting case in which an extensive defect in the hard palate was corrected by borrowing a skin-flap from the forehead. The little patient, aged 6 years,

was born with a total labio-palatine (right) fissure of uncommon breadth. The fissure in the palate was operated upon after Langenbeck's method, the approximated muco-periosteal surfaces uniting *per primam* along the whole line; but there remained on the left side, between the border of the flaps and the row of teeth, a defect more than 1 centimetre (0.40 inch) in breadth (see cut), through which the mouth and nose directly communicated, and this in consequence of the nearly vertical position of the palatine process of the left upper maxilla,—a condition which exceptionally occurs in very broad fissures. The

parents were poor and unable to furnish an obturator. "I therefore resolved to close the fissure by borrowing a frontal flap with a long pedicle, which I could yet introduce through the open labial gap. I first cut out a periosteal skin-flap from the forehead (see cuts below), the defect in the forehead being immediately closed by sutures. Then I grafted the raw surface of the flap (its periosteal surface) with epidermal grafts, after the Thiersch method, and replaced it with its raw grafted surface up upon the forehead, to which it was carefully bandaged. After eight days the grafts had taken,



ROTTER'S OPERATION FOR CLEFT PALATE.
(*Münchener Medicinische Wochenschrift.*)

and I now had a skin-flap which was covered with epidermis on both sides, and seemed to be secure from the danger of drying up, when in its new position in the mouth, by exposure to the double air-currents, the nasal and the oral.

"In order to make its pedicle sufficiently movable, I had to prolong the right cut on the side of the nose until it went into the harelip, and to detach the right ala of the nose from the nasal aperture. The flap in the palate healed beautifully and has remained unchanged, as I have been able to demonstrate at the last Congress of German Surgeons (two years after the operation), in

spite of the continued moisture from saliva and injuries from mastication."

According to Rotter, the literature of uranoplasty offers two instances only besides this in which attempts have been made to correct the palatine defect by the borrowing of flap material from other sources than the palate itself: the first that of Blasius and the second that of Thiersch, who operated quite successfully in 1868.

In connection with the preceding good reports which come from Germany, it is necessary to mention the equally vigorous and successful evidences of progress which come from France. Ernest Hart²_{Mar. 9} refers in some detail to the later and notable work of Trélat, also to that of Ehrmann, of Mulhouse,¹¹⁰⁵ presented to the Congress of French Surgeons in 1888. In this *mémoire* Ehrmann describes a number of operations which he had performed on very young children. Of 41 children on whom he had performed urano-staphylorrhaphy, 10 were under 2 years of age; in 6 cases there was complete success, 2 were unsuccessful, and 2 died. Twenty similar operations, performed between the ages of 2 and 6, gave him 16 successes, 1 failure, and 2 deaths, due to diphtheria,—an accidental complication, which can hardly be put to the debit of the operation itself; 11 patients, operated on between 7 and 10 years of age, gave 10 cures and 1 failure, due to intercurrent measles, without death.

About March 9, 1889, Trélat was about to complete his one hundredth operation of uranoplasty. He operates on his patients under chloroform, with the head thrown back, the gag placed in the mouth, the surgeon behind the head of the patient. Whatever be the extent of the division, the operation lasts between one-half and three-quarters of an hour. The greater part of the time is occupied in watching the respiration, establishing anæsthesia, and drying the field of operation. The hæmorrhage resulting from the paring of the flaps and the incisions for liberating them is more or less troublesome, but never assumes disquieting proportions. Consecutive hæmorrhage is always arrested by a little compression. It being impossible to obtain asepsis of the mouth in spite of repeated antiseptic washings, the track of the threads easily becomes infected, and has a slight ulcerative border which compromises union; hence, Trélat has now adopted the practice of

removing the threads at a very early date. He removes one of them on the second day and the rest on the third day. Small fistulæ sometimes occur either in the track of the threads or on the line of suture; so long as they do not exceed the volume of a quill, they go on to cure spontaneously and easily by granulation of their border. A cure after one operation is the rule. In 20 or 25 per cent. of the cases a supplementary operation is necessary. Definite failure is infinitely rare. As to the results of the operation, Trélat is to-day more than ever convinced of their value and of their excellence. Some subjects appear, after appropriate exercises and instruction, to recover absolutely correct speech; a large number acquire correct pronunciation of all sounds and words, but not without some grimacing of the face or some guttural sound. In a very small number the pronunciation remains quite defective, but in these feeble intelligence or refusal to take necessary trouble in the subsequent exercise of speech has a predominating influence.

SURGERY OF THE TRIGEMINUS.

A. Obalinski, of Krakau, Austria.¹¹³_{Mar. 3} after briefly reviewing the operations of Velpeau, Paravicini, Meuzel and Menzel, Bruns and Kühne, Sonnenburg and Lücke, of Pancoast (the parent operation), and of Krönlein, for the extirpation of the inferior maxillary division of the fifth pair, which are all more or less objectionable according to the author, proceeds to consider more in detail the recent operation of Mikulicz (as well as that of Krakau) and his own operative method, which were devised for the same purpose.

As the operation of Mikulicz, which was first described by its author³³⁶_{No. 24} in 1888, is not generally known, we will briefly reproduce it here as described by Obalinski.

Mikulicz's Method.—A curvilinear incision is made from the tip of the mastoid, in front of the sterno-mastoid, to a point parallel with the great cornu of the hyoid, the lower end of the incision reaching the lower border of the jaw immediately in front of the insertion of the masseter. A flap is now dissected up in its superficial layers until it reaches the terminus of the incision over the jaw, when all the tissues down to the periosteum are to be cut through and elevated, thus denuding the bone sufficiently to allow a chain-saw to be conducted subperiosteally around the horizontal

ramus, just back of the *dens sapientiæ*. The cavity of the mouth not being opened by this procedure, the jaw is now divided by the saw and the internal pterygoid is detached with scissors from its insertion at the angle of the maxilla. If the detached body of the jaw is now pulled up strongly with a hook or retractor, and the anterior portion of the maxilla be drawn forward, a funnel-shaped space is produced by the separation of the bones, the tip of the funnel projecting inward toward the base of the skull. All the large branches of the inferior division of the fifth are seen within this space and their relations recognized without difficulty. Finally, by following either the inferior dental or the lingual as guides, no trouble is experienced in exposing the main trunk at its exit from the oval foramen. After the resection of the nerve the jaw fragments are replaced and sutured, etc.

This method of Mikulicz has been modified by Obalinski, though the latter operator devised his procedure in entire ignorance of the preceding operation of Mikulicz. Obalinski¹¹³_{No.9} claims for it several advantages, which are stated here in order that the distinctive features of both operations may be better understood by the reader.

Obalinski's Operation.—1. The operator makes his incision into the soft parts along the lower border of the inferior maxilla, from a point 3 centimetres (1.181 inches) above the angle to a point 3 centimetres (1.181 inches) in front of it. By this means Obalinski believes that he obtains a better cosmetic result, as the scar is hidden by the shadow of the jaw. 2. He likewise saws the bone subperiosteally, not in front of the masseter, but rather behind, or, more precisely, after the posterior fasciculus of this muscle has been detached from its insertion; in this way the functional integrity is preserved and its valuable assistance in maintaining the divided fragments in apposition not lost. 3. He tries to divide the body of the jaw not in a vertical, but in a horizontal direction, by which means the same surfaces are better kept in confrontation, especially when disturbed by motion.

An additional contribution to the same subject has been made during the year by Emmerich Ullmann, assistant to Professor Albert, at Vienna.¹¹³_{Jan.20} This writer also reviews in an instructive manner the methods of other operators, including that of Mikulicz, previously described. He has devised two operations: first, one

involving the resection of the malar for the division of the second and third divisions of the trifacial at the base of the skull, and which he has adopted in 3 of the 5 cases which sum up the total of his experience in trigeminal neurectomy; and, second, an operation by which the inferior maxillary nerve is extirpated by exposing its inferior dental branch behind the jaw, and without dividing the bone. This method was originally described by Kühne and later by Sonnenburg, so that the author does not claim priority in its performance, though he appears to have done it independently.

First Method of Ullmann.—A convex incision, beginning at the external border of the lower eyelid and carried, with its convexity downward, to the tragus. The lowest point of the incision reaches the level of an imaginary line extending from the columna of the nose to the tip of the lobule of the ear (same as in Krönlein's method). The skin is now dissected upward to the base of the incision and retracted in that position. The periosteum is now detached from the processus frontalis of the malar, and from the external floor of the orbit; the eye-bulb is now protected with a blunt retractor. A chain-saw is now guided through the fissura infra-orbitalis (spheno-maxillary fissure) into the zygomatic fossa, below the zygomatic arch, close to the superior maxilla. By cutting the bone at this point the osseous connection of the malar with the maxilla are severed. The chain-saw is now again guided from the spheno-maxillary fissure into the temporal fossa, and the frontal process of the malar is thus cut through. The malar is now held only by its zygomatic root, and this is severed with chisel and hammer. The bone can now be easily pushed downward; the temporal muscle is cut transversely, the periosteum at the base of the skull is peeled away, and the inferior maxillary division of the fifth, which is now thoroughly exposed, is readily cut on a level with the foramen ovale. "After the neurectomy is performed the operation will be made more thorough by entering the foramen with a narrow, sharp spoon, and cutting away the central portion of the nerve for some distance within the cranium." Following the judicious practice of Salzer, Ullmann plugs the foramen with iodoform gauze. Bleeding during the whole operation is comparatively small, and can be stopped by simple compression. After the neurectomy, the malar is replaced and secured to its position by catgut sutures.

Ullmann insists upon the advantage of cutting the temporal in its middle portion, rather than at its insertion in the coronoid process of the jaw; he equally condemns, and with good reason, the practice of resecting the coronoid process as followed in the operations of Krönlein and others.

The second division and Meckel's ganglion can also be cut off by this operation on a level with the foramen rotundum at the base of the skull. The author was successful in the 3 cases in which he performed this operation, but when he presented the last patient to the Imperial Society at Vienna, he stated that this operation, with all similar procedures of a heroic character, should be regarded as inferior to the following method, which he then described:—

Second Method of Ullmann.—This method is almost identical with that of Kühne and Sonnenburg, differing from it only in the fact that these operators only aimed at the division of the inferior dental branch of the third division of the trifacial, while Ullmann utilizes the same incision to attack the whole of this inferior division, which he cuts off on a level with the foramen ovale at the base of the skull. The head is inclined slightly toward the healthy side so as to bring the angle of the lower jaw of the affected side into prominence; chloroform is administered. An arched incision from the lower border of the parotid (therefore about $1\frac{1}{2}$ centimetres—0.59 inch—above the tip of the maxillary angle) is carried to a point a little in front of the facial artery, where it crosses the jaw. The cut thus follows the contour of the jaw, though it should lie 1 millimetre (0.04 inch) under the maxilla.

All the superficial structures should now be cut to the inner surface of the bone, and the insertion of the internal pterygoid to the angle of the jaw detached with scissors. The lingula, or spine of Spix, is now felt for, and the inferior dental exposed. A threaded aneurism-needle is now passed around the inferior dental and the nerve ligated, the ligature being left long and attached to the central end of the nerve. After its section at the dental foramen, and with this thread as guide, the surgeon should be able to follow the nerve to the inferior division of the fifth, and cut it on a level with the foramen ovale. The thorough retraction of the soft parts toward the middle line is of great assistance in clearly exposing the nerves, and Ullmann has devised a special spatula for the pur-

pose. At the dissection, near the foramen ovale, a slight bleeding occurs, because of the venous plexus which is situated at this point, but is readily controlled by a gauze tamponade. "The operation, as I have described it, and which was performed on my two last neuralgic patients, offers the following advantages when contrasted with other methods devised to effect the central neurectomy of the trigeminus: 1. The large and somewhat mutilating face operations necessitated by the methods of Cr  d  , Kr  nlein, Salzer, Mikulicz, and others, involving the resection of the zygoma, are avoided. 2. The inferior dental is readily found, and can be easily utilized as a guide to the foramen ovale. 3. A disfiguring and permanent facial palsy resulting from division of the facial is avoided. 4. Much bleeding is impossible. The arteria meningea media is separated from the nerve by loose cellular tissue, and it can be readily kept out of the way. 5. The scar lies hidden behind the jaw. 6. Traumatic ankylosis is completely avoided."

Paul Segond, of Paris,⁹¹ related his experience with the "Lossen-Braun" method for the radical extirpation of the superior maxillary division of the fifth and Meckel's ganglion, at the Congress of French Surgeons, held in Paris, October 7th to 12th. He was the first to practice this method in France, and advocates it as the method of election in all cases which demand surgical intervention. He has systematized the technique, and describes the various stages with great precision and clearness. With the exception that Segond pulls out the superior maxillary completely, after its division, through the infra-orbital foramen, and that the temporalis is not cut but retracted during the operation, the method of Lossen-Braun is almost the same as the operation more lately described by Ullmann. Segond has operated three times successfully by this method, which is followed by no serious consequence and but little deformity. In all cases primary union, without drainage, is a condition regarded by Segond as essential to success.

In the discussion that followed Segond's paper, Molli  re, of Lyons, also reported 3 cases of neuralgia of the second division in which he had extirpated Meckel's ganglion. His operative procedure is peculiar and not always easy to realize. He practically performs Carnochan's operation (*i.e.*, reaching the foramen rotundum through the antrum) without resorting to a visible cutaneous incision. By exposing the infra-orbitalis through an incision at

the labio-gingival junction, which liberates the upper lip, and breaking through the anterior wall of the antrum, he finally reaches the nerve in the speno-maxillary fossa.

Apropos of the second method of Ullmann, which is simply an amplification of that originally devised by Kühne and Sonnenburg, we would mention the method suggested independently by A. Galignani, of Plaisance, Italy, ¹⁰⁰_{Aug. 30} which is analogous, if not identical, with it in every respect, excepting that it is not so ambitious, and aims simply, as in the original Kühne and Sonnenburg methods, at the resection of the inferior dental nerve. Galignani operated successfully upon 1 patient by this method.

In America the surgery of the trifacial has also received its due share of attention. M. Richardson, of Boston, ⁵⁹_{June 29} reports 57 operations on peripheral nerves taken from the records of the Massachusetts General Hospital, of which 28 had been performed by himself; 35 cases of neurectomy for neuralgia are briefly reported. Most of the cases were neurectomies for trigeminal neuralgia. The result of these operations has been almost invariable temporary success, the period of immunity from pain lasting from a few weeks to several years, while in some permanent cure has followed. The length of the period of relief bears some relation to the amount of nerve removed. Several cases of buccal neuralgia were treated by the method of Zuckerkandl, the main trunk of the nerve having been divided as it emerges from the space between the coronoid process of the lower jaw and the insertion of the temporalis. Several methods of operating on the inferior dental nerve were described, the most important of which was the total avulsion of the nerve by exposing the trunk over the dental and mental foramina. In one case the inferior dental nerve was pulled out by the intra-buccal incision. In several cases the author had elevated the periosteum of the orbit and exposed the superior maxillary division in the speno-maxillary fissure, and, after exposing it again at the infra-orbital foramen, had pulled it out (Langenbeck's method). This method seems preferable to Carnochan's operation of reaching Meckel's ganglion by going through the antrum. One of the cases operated upon by the preceding method ended fatally.

While Richardson, of Boston, thus favors Langenbeck's operation for the superior maxillary division of the fifth in preference

to Carnochan's, Abbe, of New York, ¹_{Aug.3} extols the latter, and believes that under the protecting ægis of modern asepsis, and with several modifications of his own, this old operation can still hold its own, in spite of the vigorous competition of the rival host of European modifications and innovations. The modifications practiced by Abbe are a small linear skin incision instead of the V, and the mouth-cut of the original method. One and a quarter inches (0.031 metre), either horizontally, vertically, or obliquely over the infra-orbital foramen, give ample room for operating. A gouge is preferable to a trephine in breaking through the antrum. A narrow, forked, blunt instrument, to straddle the nerve and assist in dragging it down into the antrum, saves it from laceration. No bleeding occurs that is not readily checked by sponge or gauze pressure. The most perfect result is obtained by packing iodoform gauze into the antrum. After thirty-six or forty-eight hours the gauze is entirely removed and the wound sutured with care.

In regard to recurrence nothing definite can be said, except that seven months after the first, four and a half months after the second, and the same time after the third case had elapsed since the three operations of the author, without any return of pain.

In regard to inferior maxillary neurectomy, Garretson, of Philadelphia, ⁶²_{Mar.15} has added 3 more successful cases. He resects the nerve on a level with the foramen ovale, on the lines of his well-known operation.

J. H. Glass, of Utica, N. Y., ⁸⁰⁹_{June} and C. C. Boenning, of Philadelphia, ¹²¹_{June} have operated successfully in 3 cases of inferior dental neuralgia (Glass 1, Boenning 2). Both of these operators independently devised methods which are very similar, and essentially consist in exposing the inferior dental as it enters the inferior dental foramen; the principle underlying the operation is not novel, as both operators contend, especially since the operations of Paravicini and others have been improved by Billroth and other European surgeons.

The causes and treatment of relapse in facial neuralgia have been very ably discussed by Andrews, of Chicago, ⁶¹_{Jan.19}; Tripier, of Lyons, ⁹¹_{June}; and Obalinski, of Krakau, ⁸_{Oct.10}

Andrews presents the results of his experience with relapsing cases, admitting that neurectomy performed for *tic-douloureux*

permanently cures some patients and effectually stops the pain of nearly all the rest for a period of from four to six months to nearly two years, but claims the majority sooner or later relapse. Now, clinical experience has demonstrated to the author the valuable fact that these relapsing cases may be freed from their pain for considerable intervals of time by operations repeated at the site of the original operative cicatrix. According to Andrews, it is not necessary to find the central stump of the resected nerve and subject it directly either to traction or excision; it simply suffices to remove the scar-tissue resulting from the previous operation. The immediate and prolonged benefit resulting from the avulsion of the scar-tissue is explained, according to the author, by the stretching to which the nerve-stump is subjected in thus forcibly tearing away the cicatrix.

Tripier reports 3 cases of inferior maxillary neuralgia, which, after thorough extirpation of the nerves, were followed by relapse at greater or less time after the operation. In all the cases the histological lesion was found to be interstitial neuritis. From his present and past experience he believes that relapses are the rule in all cases of long standing and presenting this microscopic lesion. As to the causes of the relapse, Tripier states that they must not be sought in nerve anastomoses, whether direct or indirect, but in secondary lesions of the nerve-centres. The central involvement is caused by a direct propagation from the periphery to the centre in parenchymatous peripheral neuritis. In the cases reported the lesion found was an interstitial neuritis, but the author has proved that interstitial may be converted into parenchymatous neuritis, and this would explain the secondary and permanent involvement of the centres. On the other hand, the author teaches that the central lesion may be of a purely congestive character, in which case permanent benefit will follow the removal of the peripheral branches. Usually, after the extirpation of the peripheral diseased parts, the functions of the central ganglia are temporarily arrested,—an effect which may be explained by inhibition. This means little, however, and the fact remains that the centres awaken again, and with them the neuralgic phenomena. In any case, the possibility of secondary lesions following a simple peripheral affection suggests the propriety of early and complete interference so as to arrest the affection before it becomes central. Furthermore, if the

centres are already involved, the lesion may be purely congestive; then a neurectomy will also relieve radically. Finally, if the disease has become fixed centrally, the relapse will follow, and, at farthest, within a year; the inhibition of the function of the centre, *i.e.*, the arrest of pain, may be obtained, I would suggest, by applying Andrew's simple cicatricial avulsion,—an operation which is, at least, not dangerous or seriously objectionable.

Obalinski ^{8 Oct. 10} details a case of relapsing neuralgia. The patient, a farmer aged 62, began to suffer with facial neuralgia in the region of the superior maxillary distribution in January, 1881, and in the nine years that followed he sustained the following operations:—

January 26, 1881, neurectomy of the infra-orbital trunk—Wagner's method—(by Obalinski).

October, 1882 (twenty months later), an operation performed but not described.

July, 1883 (nine months after second operation), scar reopened, nerve-stump cauterized.

January 16, 1884 (about five months after last operation), Mikulicz performs Langenbeck's operation to reach the foramen rotundum (requiring resection of upper jaw).

Midsummer, 1887, Trzebicky performs the Lücke-Lossen-Braun operation, in which the coronoid process of the lower jaw is temporarily resected.

In June, 1887, patient still frenzied with neuralgia, and starving from ankylosis due to the Lücke-Lossen-Braun operation, again implores relief. Obalinski attempts a second Langenbeck, in order to scrape the nerve at the foramen rotundum, but fails to resect the upper jaw because of hardness of callus; then an attempt is made to relieve the ankylosis by excising the maxillary condyle. In so doing the inferior dental is excised for some distance, and when the patient awakens his neuralgia is entirely and unexpectedly relieved. The problem is, How did the resection of the inferior dental relieve a neuralgia in the territory of the superior maxillary division, and especially after the previous excision of that trunk?

Obalinski argues in favor of the theory of *anastomoses*; but it seems to me that this is a plain case of permanent secondary involvement of the centres, and that the relief experienced is but the

result of the temporary inhibition of these centres by the action (reflex or otherwise) of the operation on the inferior dental, as more satisfactorily explained by Tripier's theory. Sufficient time has not yet elapsed to permit us to assume the fact of permanent recovery.

SURGICAL MYCOSES.

BY ERNEST LAPLACE, A.M., M.D.,

PHILADELPHIA.

SURGICAL TUBERCULOSIS AND SCROFULA.

Etiology.—Up to recent years the two separate diatheses, the tubercular and scrofulous, were universally recognized. It was acknowledged that the scrofulous were more disposed than others to become tuberculous, but not until Koch's demonstration of the tubercle bacillus, in 1882, was the absolute identity of the two diseases fully established; so that, as Peters³⁹_{June 1} stated, those who hold a contrary view are "such surgeons at home and abroad who do not perhaps enjoy the privileges of closely following the rapid advances of pathological investigation."

Pavlovski⁵⁸⁶_{V.10, p. 635-663; Nov. 2}⁶ made researches in Pasteur's laboratory on the development and spread of articular tuberculosis. Cultures in peptone glycerin were injected into the knee-joint of guinea-pigs, and the joints were examined after the lapse of from half a day to eight weeks. After twelve hours the bacilli could be found in the connective-tissue corpuscles and in the white blood-corpuscles. It was found that the white corpuscles play an important part in the production of tubercle, undergoing a series of progressive changes until they assume an epithelioid character, experimental tubercle consisting of epithelioid cells, due both to white corpuscles and to connective-tissue corpuscles. Pavlovski was also enabled to demonstrate the propagation of the bacilli along the course of the lymphatics, the nearer glands becoming first infected and subsequently those at a greater distance.

Modigliano, of Pisa,⁴¹_{Sept. 19} has inoculated 45 guinea-pigs with the substance of scrofulous glands of patients and developed tuberculosis in every instance. Secondary inoculations were now made from the diseased guinea-pigs. His experiments led him to the following conclusions: 1. The virus of scrofula is really an attenuated form of the tuberculous virus; the disease caused by it

(K-1)

is much milder than that caused by real tubercular virus and is harmless to rabbits. 2. After passing scrofulous virus through a generation of guinea-pigs, its virulence becomes intensified to that of tuberculosis, and inoculations with it on rabbits are successful, while at first this property was entirely wanting.

Babes, ⁹⁶_{July} in his communication to the Congress for Tuberculosis, gave the result of an extended series of observations on 93 infants affected with tuberculosis. In the majority of cases the micro-organisms of suppuration were present with Koch's bacillus. The author concludes that tubercular lesions open the door to the entrance of other micro-organisms which aggravate the tuberculous process and are often the cause of other septic and pyæmic phenomena with apparent parenchymatous degenerations of the organs of infants.

Pick, ⁸_{Mar. 28} recognizes that the following affections are due to the development of the tubercle bacillus, viz., lupus, scrofuloderma, tuberculous wart, and dissection warts. He has found numerous tubercle bacilli in the latter affection; at first there were probably other micro-organisms present which changed the parts into a soil suited to the development of the tubercle bacillus.

Treves, ⁶_{Sept. 28} points out that it is only in exceptional cases that any difficulty arises in the diagnosis between scrofulous glands and simple adenitis. *Simple adenitis* is a scrofulous disease of long duration. The gland is more painful and tender in simple adenitis. The gland is ill-defined, merged in the general inflammation, and cannot be grasped as a definite tumor; ends quickly by suppuration or resolution. No scarring follows. Scrofulous glands feel solid, more defined than in adenitis. Can be grasped and pushed about. They last more than two or three months. Scars follow.

Lépine, ²¹¹_{Mar. 10} calls particular attention to the frequency of axillary adenitis as secondary to ancient tubercular lesions of the lungs. Mollière, ²¹¹_{Mar. 10} states that tuberculosis travels from the lungs to the pleura, thence to the intercostal spaces and the spinal column.

Annandale, ²_{Apr. 6} says that in tubercular adenitis the channel of infection is in most cases the lymphatic circulation, and there is generally to be traced (a) some local cause of irritation; (b) a constitutional dyscrasia. The success of the bacillary invasion depends (1) on their number; (2) on the strength of the tissue.

Treatment.—Howard Marsh, ²_{July 29} would limit operative inter-

ference to the opening of abscesses, and trusts to prolonged rest, with extension and fixation and general hygienic precautions. He gives statistics to show that the danger of general infection from bone and joint tubercular disease has been exaggerated and that it is known to occur only in 5 per cent. of tubercular hip-joint disease. He is strongly of the opinion that the tubercular process in bone has a great tendency to be self-limited and to undergo recovery, and that in some cases suppuration is but nature's method to throw off dead tubercular matters. Against a mortality of 20 per cent. he brings one of 5 per cent. ; and while the advocates of early excision have to record a large number of partial successes, and shortened, enfeebled, and distorted limbs, Marsh is able to show a much higher percentage than they do of strong, firm, movable limbs of proper length.

Hofmokl ⁸¹_{May 28} is also of the opinion that the operative treatment of scrofulo-tuberculous affections of joints should be reduced as much as possible to a minimum. In children and young adults, he contents himself with opening of the joints, evacuation of the pus, drainage, fixation of the joint, and constitutional treatment. In adults with extensive carious foci and marked failure in health, he amputates the diseased part. The use of iodine, sea and sulphur baths, is attended with excellent results.

In his conclusions as to operative treatment of tuberculosis Kay ⁶⁰_{Feb. 9} is of opinion that every local deposit may be a source of general infection, hence all enlarged glands not due to mechanical irritation, and not yielding promptly to medication, should be removed if possible. Besides, the removal of suppurating glands is easy and free from danger.

In an elaborate clinical study of the subject Van Hook ⁹⁶_{Dec. '88, Jan., Feb.} draws up the following conclusions in the treatment of sacro-iliac tuberculosis: 1. "Sacro-iliac disease is not directly amenable to treatment by drugs, except in so far as they improve the general condition of the patient. 2. Counter-irritation—preferably by cautery—is indicated when there is pain, lameness, or tumefaction, without abscess formation. 3. Mechanical rest, which is here also physiological rest, is the treatment par excellence when no abscesses are present. 4. When abscesses have formed radical operative interference must be resorted to. 5. Extra-pelvic abscesses must be operated upon by direct incision and eradication. No

tubercular material should be allowed to remain if a radical operation is determined upon. * 6. After-treatment should include, besides asepsis, continued rest, aided when necessary by extension and perhaps a pelvic belt." Mollière²⁶_{Nov.} admits that when no distinct evidence of suppuration exists tuberculosis may be nearly always successfully treated in children without the knife.

Leclerc⁵⁵_{Sept.21} has contributed a valuable memoir to the Surgical Congress of Paris, in which he summarizes the following as the immediate and distant results of operative procedures in surgical tuberculosis: 1. Immediate results. His observations prove that (a) the operation, conducted antiseptically, always gives union by first intention; (b) the operation may dispel morbid phenomena which indicated the beginning of tubercular septicæmia; (c) secondary operations sometimes produce an unfavorable effect upon tubercular foci in the lungs. 2. The surgical treatment of local tuberculosis gives radical cures which can last an indefinite period of time. He cites 10 cases to support his conclusions.

Verneuil³_{Oct.3} maintains that tubercular disease, when left to nature, has no tendency to cure. The immediate results of operations are satisfactory enough if the tuberculous seat of the disease be entirely destroyed, but in many cases a fistula follows. As to the ultimate results, he thinks they are generally bad for the patient, and the surgeon personally has not much reason to be satisfied. Forgue¹⁰⁰_{Apr.6} removes all tuberculous lymphatic glands, believing that the operation is exempt from danger if the proper precautions are taken. The results are better than from the expectant treatment, and the chances of general tuberculosis are diminished. Still, he concedes that general medication should be an essential accompaniment of the surgical treatment.

"Of all methods of treatment of local tuberculosis," says Annandale,²_{Apr.6} "the most successful and scientifically sound is the operative procedure." Treves⁶_{Sept.14} is altogether in favor of excision, and concludes that if forced to limit himself to one method of treatment he would select this one. He suggests that scrofulous glands should be removed for fear they might infect the healthy ones; still, he would be "very sorry to recommend excision as a universal practice, or, in fact, to lay down any general rule for the treatment of this troublesome affection. Each case must be judged on its merits and treated accordingly."

In the medical treatment of local tuberculosis the injection of iodoform and ether, first suggested by Verneuil in Paris, seems to have obtained universal acceptance. Hofmohl¹¹_{Mar. 14} has injected as much as 200 grammes ($6\frac{3}{4}$ fluidounces) of a saturated solution of iodoform and ether without any dangerous effects. He recommends that a part of the ether be allowed to run out soon after the injection, especially if the patient complain of severe pain. Dörlinger,³³⁶_{May 18} on the other hand, has seen a great amount of shock and evident intoxication resulting from the injection of 30 grammes (1 fluidounce) of a 5-per-cent. iodoform-ether solution in a child 5 years old. This condition lasted two days, without further after-effects. In Vienna, and in some Paris clinics²⁴_{May 19} glycerin has been substituted for the ether, and a cold abscess after being evacuated is treated with the following injection:—

R	Iodoform,	10 parts.
	Glycerin,	70 parts.
	Hot distilled water,	20 parts.—M.

Triturate the iodoform with a few drops of alcohol and the glycerin, then add the water.

Internally iodoform is highly recommended also¹⁰⁰_{Aug. 20} to combat the tuberculous diathesis. Iodoform, 1 grain (0.06 gramme), and powdered coffee, 2 grains (0.12 gramme), make a powder in which the smell of iodoform is masked, and which, when administered three times a day, will soon exert a beneficial influence upon the patient. Calomel has been found by Martell³³⁶_{Nov. 20} to have in a high degree the property of causing tuberculous wounds to heal (that is, it has the property of killing the bacilli *in situ* and of changing the tuberculous surface into a simple ulceration), and further, that mercurial poisoning is not to be feared even if long used and in large quantity. The sublimate formed by the calomel produces with the albumen of the tissues an insoluble compound incapable of being absorbed. The examination of the pus showed the presence of this compound of albumen and mercury, which is in itself an antiseptic.

Fernet, of Paris,¹²⁶_{Oct. 15} ⁹⁹_{June 13} calls attention to the value of camphorated naphthol as an antiseptic application in tuberculous ulcerations. This substance is a mixture of 1 part of naphthol with 2 of camphor; it is a liquid of syrupy consistence, and may be applied by means of a camel's-hair pencil. In commenting upon a pronounced case of tuberculosis of the base of the tongue

successfully treated by this method, the author insists upon the necessity of immediate treatment of these primary lesions, which are often the precursors of a general infection.

Albert, of Vienna,³³¹_{No. 4} speaks highly of the use of balsam of Peru in the treatment of local tuberculosis, according to the methods of Landerer. The balsam is spread upon gauze, which is then laid upon the affected surface. The only ill result which is likely to occur is its stimulating effect upon the kidneys. He instanced 2 cases in which acute nephritis developed. In cases of tuberculosis of bone, the fungous masses having been removed, the following emulsion is applied: \mathcal{R} Balsam. Peruv., mucil. gum. acac., āā 1.0 gramme (15 minims); ol. amygdalæ, q. s.; make emulsion. Sodii chloras, 7.0 grammes (105 grains); aq. destill., 100 grammes ($3\frac{1}{3}$ fluidounces). This is injected into the tuberculous cavity.

Vámosy¹¹³_{May 19} reports 28 cases from which he bears witness to the efficacy of this treatment. The granulation of the wound is promoted. The gauze preparation of Peru balsam is the form to which Vámosy gives the preference. In his experience the kidneys have never been affected by the treatment.

Prophylaxis.—Among the conclusions arrived at by the Paris Congress on Tuberculosis is that tuberculosis caused the death of 15,000 inhabitants of that city in 1884—one-fourth of the total mortality for that year. After directing the precaution of sterilizing, by heat, milk, meats, etc., liable to be tuberculous, special attention is called to the thorough disinfection of all that has been connected with or used by a tuberculous patient, such as linens, bedding, etc. The Congress warns against the constant company of tuberculous patients, in view of the infectious nature of their breath, sputa, and clothing. Children especially should be protected by the above prophylactic measures.

SUPPURATION—ABSCESS.

Etiology.—Grawitz²⁰_{Apr. 1} proves that suppuration may be caused by the injection of irritating substances unaccompanied by micrococcus or ptomaine. His experiments were performed on dogs, with careful aseptic precautions. A certain quantity of oil of turpentine was injected subcutaneously, and the wound was closed with collodion. Over this an antiseptic dressing was placed. In a few days a swelling accompanied by fluctuation occurred, and

when opened a fluid with the characteristic appearance of pus was found, but it contained no cocci.

Steinhaus⁵⁸_{Jan.3} has found in the contents of an abscess large quantities of the micrococcus tetragenus to the exclusion of the ordinary germs of suppuration. Steinhaus thinks, therefore, that the micrococcus tetragenus, under certain conditions, might become a cause of purulent process in man.

Atkinson⁶¹_{Sept.14} concludes that the emigration of white blood-corpuscles participate in the formation of pus, and is probably its main source. Suppuration is caused by the presence of certain microbes, mainly the three varieties of staphylococci, only when a previous inflammation is present in the tissues, furnishing a favorable soil for the development of these microbes. Irritating chemical agents in the tissues may likewise be followed by suppuration. Rosenbach²⁶_{May 1} demonstrates this fact in the following way: Small glass bulbs containing metallic mercury are introduced by incision, with aseptic precautions, beneath the skin of the animal, and left there until the wound has healed. Then, after a rest of three or four weeks, they are broken subcutaneously by a blow and the effects watched. The tubes and the mercury are sterilized at the moment of filling at a temperature of 200° C. (392° F.). "It might be objected, however, that even this does not exclude entirely the possibility of germ intervention; but this last difficulty has been gotten rid of by the use of antiseptic agents themselves as the irritant; and, in the presence of microbes only, is it not their ptomaine and not themselves which induces the formation of pus?"

In a classical article Ribbert⁶⁹_{Feb.7} sustains Metschnikoff's phagocyte theory, and concludes that the emigration of leucocytes in inflammation is for a purpose beneficial to the organism, for the staphylococci and other bacteria of suppuration are destroyed partly through these leucocytes acting as scavengers (phagocytes) and partly by being imprisoned in a mass of cells.

Lemière,²²⁰_{May 10} recognizing the possibility of pus formation without the presence of bacteria, establishes the following difference in the formation of pure *chemical* abscesses and those due to the presence of microbes: In chemical abscesses, the cause being limited, the effect of pus production is limited to the time taken for the irritant to act. Even if the chemical action is weak, the irritation

may be sufficient to produce a barrier of newly-formed cells which will encyst the abscess and prevent its spreading, sometimes before the full action of the irritant has taken place. Abscesses due to microbes, on the contrary, are *progressive*, not limited; the germ, once introduced in a favorable soil, can continue to proliferate and bring to the neighboring parts a new source of infection.

Clinical.—Helweg⁷⁵_{Sept.15} relates 7 cases of diffuse phlegmon, or deep abscess, which he thought were due to a nervous origin. He maintains that such cases are often found in insane asylums; that they can always be connected with some lesion of the nervous system, and that they are frequently found accompanying or following an attack of cerebro-spinal meningitis.

Duhamel²²⁰_{Feb.8} has treated a case of palmar abscess involving the whole hand, and which had started in an abrasion of the annular finger,—a very rare occurrence. It seems that the abscess healed, retaining within it a drainage-tube 2 centimetres ($\frac{3}{4}$ inch) long during a whole year, without causing the least trouble. This was no doubt due to the free use of antiseptics during the treatment. The tube found its way to the surface of the skin. It was removed and the wound healed kindly.

Verneuil and Clado³_{Feb.13} call attention to the possibility of the spirilli existing in the saliva acting as an exciting cause to the formation of abscess. They relate several cases of abscess of the sub-maxillary region, in which, in addition to the germs of suppuration, these spirilli were found in large quantities. Another case of a trivial wound being sucked by the patient who had decayed teeth. An abscess soon formed in which the spirilli of the saliva seemed predominant.

Treatment.—The following treatment as practiced by Lucas Championnière³⁵_{Oct.10} is very useful: Abscesses are incised freely, drained, and thoroughly irrigated with 1 to 1000 sublimate solution. Instruments are sterilized and the parts washed with a solution consisting of R̄ Glycerin, carbolic acid, each 375 grains (25.0 grammes); boiled water, 1 quart (1 litre). The position where the abscess occurred is now covered by a piece of rubber, over which a bandage is placed. Twenty-four hours later the wound is washed a second time with the solution previously employed, the drainage-tube being replaced or left out, according to the condition of the wound.

Leu,⁴⁹⁵_{No.7: Aug.17}⁶ recommends the subcutaneous injection of carbolic acid to abort an abscess or furuncle. The proper strength is a 3-per-cent. solution. This was found highly efficient in the German army. Shimwell¹⁸⁶_{Sept.} recommends the silico-fluoride of soda, 7 grains (0.45 gramme) to 1 fluidounce (30 grammes) of water, as the least toxic antiseptic solution for washing out an abscess-cavity. Poulticing should be omitted, for the heat and moisture only promote the formation of fresh pus. In abscesses about the neck the shock resulting from the operation seems greater than elsewhere; hence special precautions are recommended as to assistants, and especially the administration of ether.

Löwenberg²⁹³_{Feb.} describes the importance of a non-irritating antiseptic for the treatment of furuncles of the ear. He prefers a saturated solution of boric acid in absolute alcohol. This solution, after a slight incision, forms the abortive treatment of the furuncle. Gerster¹⁰¹_{July} insists upon the fact that an incision, even if it does not strike the exact spot of the suppurating focus, will prevent the extension of the inflammation. He calls attention to the abnormally pale condition of the skin over the affected area of a deep-seated, acute inflammation. Should no fluctuation be felt, the end of a probe on pressure will detect the most sensitive spot, and there an exploratory incision should be made with a tenotomy knife. The focus will surely be detected by this measure.

ACTINOMYCOSIS.

The occurrence of actinomycosis in man, first definitively settled by Israël's publication,¹⁰³²₈₀ has now obtained an undisputed rank in pathology. Israël published 30 cases as the result of his own observation. Afanassieff and Schultz³⁴_{June 11} say that the total number of cases of human actinomycosis on record up to the 1st of January, 1889, amounts to 179. During the year 1889, 32 new cases have been reported, of which 12 proved fatal, the rest yielding to treatment. Israël found that this disease produced in man very nearly the same disasters as in beasts; that is, an inflammation of the gums or the roots of decaying teeth, then swellings and abscesses of the jaws. The abscesses opened, but never healed. The radiating fungus was always found present. Most patients perished miserably through exhaustion by the formation of never-healing abscesses.

Etiology.—After reporting 2 cases of actinomycosis observed in his own practice, Baracz¹¹³_{Jan 6} formed the following hypothesis as to the manner of infection: 1. Flies seem to have been the bearers of the fungus from the stables. 2. The fungus may have found entrance during breathing, for opposite the patient's house were hay-lofts that were frequently opened for ventilation. 3. Lastly, fungi may have gotten into the rain-water the patient washed in, stored as it was in a cistern in the yard. No fungus could be observed on the walls of the house. In 1 case the disease was transmitted by kissing. Patients were bridegroom and bride. The disease developed in both cases in the lower maxilla near the seat of a carious tooth. Ammentorp³⁷¹_{B.22, No. 4} attributes the infection in 1 case to inspired air. The disease existed in the lung, and the patient wore a tracheal cannula for several years.

Lejeune²⁹³_{Jan.} observes that the fungus is found in the cereals which enter into our foods, and may directly find a nidus in a carious tooth or a fissure in the mucous membrane of the mouth. Nasse⁴_{P.120; July}⁹⁶ reports a case of actinomycosis of the base of the skull in which carious teeth were also supposed to be the starting-point.

Morphology.—Afanassieff and Schultz³⁴_{June 11} have succeeded in isolating the radiating fungus in the state of a pure cultivation. Given a pure culture of the microbe, it proves to consist of characteristic grains which are identical, both microscopically and macroscopically, with those found in actinomycotic products in man. The grains vary exceedingly in their size, some being hardly perceptible to the naked eye, while others are from 0.1 to 1 millimetre ($\frac{1}{2} \frac{1}{5} \frac{1}{10}$ to $\frac{1}{2} \frac{1}{5}$ inch) in diameter. Under the microscope they represent a felt-like structure composed of extremely fine, dichotomizing, and interweaving filaments, which, to all appearance, start from a common centre to run toward the periphery of the grain in a radial way. The smallest granules resemble a little star. In older grains there may be observed slight terminal inflations on some threads. The authors have not been able to detect in cultures anything like the genuine terminal clubs such as occur in actinomycotic products. These clubbed extremities are supposed to exist only in very old fungi, for in sputa they are often met lying in enormous quantities side by side with clubless ones.

In common with Boström and Israël the authors conclude that the actinomycotic microbe does not represent a mold fungus

(as Harz asserted), but a member of the highest bacterial class called *cladothrix*, and chiefly characterized by its having the shape of ramifying filaments. In view of the fact that the colonies of the microbe have a radiary arrangement, the bacterium should be named *actino-cladothrix*. They have reproduced the disease in rabbits and guinea-pigs with the artificial cultures, and found the characteristic microbe present in all cases; so that it is impossible to mistake the identity of the affection in man and beast, or to confound it with any other disease.

For duly studying the fungus, pus or sputum uncontaminated by other bacteria should be selected. When examined with the naked eye the said products are found to contain whitish or yellowish grains. The latter should be picked out by means of a platinum loop, and immediately thrown into test-tubes with broth, fluid blood-serum, meat-pepton-agar, etc. The tubes are placed in the thermostat at the body temperature for from three to fifteen days. There soon appear in the tubes gray, whitish, roundish granules of various sizes, which, when the tubes are left alone, form large conglomerates attaining the size of a small pea. When the cultivation material has been quite pure, the broth remains clear and limpid all through.

Any contamination by other bacteria interferes very materially with the growth of the *actino-cladothrix*, since the former begin to proliferate far more rapidly than the latter, penetrate into the grains themselves, and make a pure culture of the *cladothrix* altogether impossible. The ordinary (Koch's) methods of isolation of individual bacterial species here prove inefficient. The authors have devised the following precautions by which alone a pure culture can be obtained: 1. It is necessary to take about 10 large glass plates with solidified meat-pepton-agar. 2. The grains should be picked out (from sputa or pus) in large number, 50 or 100, or more, and distributed over the plates at a distance of from 3 to 5 centimetres (1 to 2 inches) from each other. 3. The plates placed in the thermostat should be carefully examined by means of a magnifying-glass every day, in order to make out which grains remain pure and which are contaminated. 4. The pure ones should be protected from contamination by removing them to another plate with a freshly-prepared medium. 5. If the selected colonies show no sign of contamination in from four to six

days, they are then to be subjected to further cultivation experiments after the method already indicated.

Kischensky^{273 Aug.} describes at great length the appearance of the fungus in various stages of its growth, and the accompanying plate has been reproduced from his work.

Explanation of the Plate.—The drawings have been made by means of Abbé's camera lucida: Zeiss, 2 Apochromatic; Apert., 1, 3; Ocul., 8; Length of tube, 180. 1. (a) Threads with cocci from a blood-serum culture six days old (35° to 37°); (b) rods that have begun to develop cocci (methyl blue). 2. Grains, two days after being planted upon blood-serum (35°); (a) rods presenting cocci strongly stained; (b) single rods with cocci; (c) unseparated rods. 3. Threads from a meat-pepton-gelatin culture (35° to 37°) presenting club-like extremities. 4. Threads from pus; (a) thread; (b) broken into rods; (c) clubbed extremities. 5. Blood-serum culture one week old; (a) rods; (b) threads; (c) threads which only stain slightly; (d) clubbed extremities which take the stain easily.

McFadyean,^{2 June 15} in an exhaustive essay on the morphology of actinomyces, refrains from expressing an opinion as to the precise position of actinomyces among the schizomycetes, but summarizes the history of an actinomyces colony as follows: 1. It has a starting-point in one or more cocci transported by the plasma currents or by the agency of a carrier cell (leucocytes). 2. The cocci multiply by elongation and subsequent fission. When undisturbed by the surrounding leucocytes, their growth and multiplication are after the manner of a streptococcus, but frequently they become irregularly grouped together (staphylococcus heaps). 3. By elongation some of the cocci give rise directly to short bacillary forms, and through these to long filaments. 4. The further extension of the colony is effected by the growth and multiplication of both threads and cocci. The former multiply by segmentation into bacillary elements, which may again elongate to leptothrix forms. 5. The leptothrix filaments may give rise by close segmentation to coccus forms. 6. The formation of clubs and such forms is evidence of diminished vegetative power of the filaments (possibly also cocci) in connection with which they originate. 7. The growth of a colony may be arrested at any moment by the agency of the animal cells (leucocytes) or by failure in the supply of the necessary pabulum. In that event, a majority of the cells tend to develop clubs at their outer ends (involution forms). The central cocci and the remainder of the filaments then disintegrate, but the clubs which offer the greater resistance (passive) to the surrounding cells may persist for an indefinite period.

Clinical Symptoms.—Fessler^{24 July 30} describes the following as



Achinomyces, *Microspora*
Microspora *Microspora*



the characteristic clinical aspect of actinomyces: 1. The slow, dragging course of the inflammation, without fever or pain. 2. The remarkable extension and induration of the parts. 3. When the process exists in bones the neighboring soft parts become bound to them through thick, cord-like masses. 4. Generally, when the affection has existed several months, the process finds its way to the surface, softening the parts and finally emptying its purulent contents spontaneously. 5. This evacuation takes place slowly, and the pus assumes quite a sero-sanguinolent character. 6. Such a focus heals quickly, and the whole growth seems to disappear, but the next week or the next month the affection re-appears in the neighborhood or elsewhere with fresh vigor. 7. Fatal symptoms are always of tardy appearance. This affection must be differentiated from syphilis, tuberculosis, and neoplasms.

Tilanus³⁴_{July 30} describes a case of a young lady whose left cheek presented an ulceration first thought to be of a specific nature. Epithelioma, then tuberculosis, and finally the diagnosis of actinomyces was established. Karl Maydl⁵⁷_{Oct 20} relates a case of actinomyces of the tongue, and refers also to 2 such cases reported by Ullmann and one by von Hacker.

In both of the cases related by Ullmann there was swelling of the lymphatic glands in the neighborhood,—a symptom which is generally wanting in this affection. These glands were removed, but no actinomyces fungus was found present, thus confirming what has not as yet in any case been disproved, that the actinomyces fungus as such does not produce metastasis in the lymphatic glands, the accompanying adenitis being due to some pus bacteria.

Lange¹_{Aug. 10} found that in one case affecting the right epigastric region suppuration extended between the liver and diaphragm in the direction of the vertebral column. The tissues above the diaphragm were infected. The patient had a hacking cough, but had not expectorated. The incised wound still gave exit to a large amount of actinomycotic matter.

Bodamer⁹_{Mar. 2} reports a case of this affection in the right temporal, submaxillary, and cervical regions.

Treatment and Prognosis.—Curtze⁴¹_{June 24} says that clinico-medical means should first be found to prevent the spread of the disease in the body; then try to prevent the entrance of the fungus into the organs. The manner in which the fungus spreads through the

different parts of the body gives us indications how to watch its destructive course. Surgical interference is almost exclusively the only means of meeting it. Actinomycosis of the lungs is difficult of treatment. As the diseased centre is generally deeply buried in the tissues, and can be diagnosed only after the case has existed a long time, successful treatment is of necessity rare. Resection of the lung might be resorted to in some favorable cases. More hopeful is the treatment of abdominal actinomycosis when the disease is apparent on the surface. Here a free incision and generous curetting works wonders, especially when followed by the antiseptic treatment. Matlakowski ⁵²⁰ _{No. 3}; ¹⁰⁹ _{June} reports a case of actinomycosis, permanently and completely cured by energetic surgical interference. An incision was made along the lower edge of the jaw, and two others, beginning from the edges of the first, encircling the whole of the diseased territory, which was removed with the curette, leaving a deep and ugly wound to heal by granulation. The patient remained well two years after the operation.

The prognosis is necessarily a doubtful one. Riehl ¹⁰⁷ _{Oct. 15} says if the presence of the disease be detected soon after it has attacked the human body there is some hope that an energetic antiseptic treatment will cut short the disease and the patient be saved. Hence the importance of an early microscopical diagnosis. There is no doubt that the disease has been acquired by human subjects from diseased beasts.

Prophylaxis.—It seems that cattle, according to Curtze, ⁴¹ _{June 24} fed on oats grown on newly-plowed land are attacked by the disease. It is at any rate certain that the fungus occurs freely on plants, and that infection takes place through the mouth being cut by the sharp fodder. In abdominal actinomycosis it is certain that in many cases the germ of the disease is introduced with the food. It is not yet known what form of the fungus appears in the oat-plant. Under these circumstances but little can be said concerning prophylactic measures in man. It is very desirable to keep the teeth and mouth-cavity scrupulously clean, and to be careful with regard to diet.

ANTHRAX.

Etiology.—Considerable work has been done during the past year in the direction of ascertaining the condition and behavior of the bacillus anthracis, under various circumstances, with a

view of ultimately counteracting its deadly effects in the human organism.

To this end Bouchard³¹⁹_{Nov. 42} injected rabbits and guinea-pigs with the bacillus pyocyaneus a few hours after they had been infected with anthrax in its most virulent form. Of 32 animals thus treated 15 recovered, 6 died of anthrax, and 11 of other causes. In these last the presence of anthrax could not be detected. The animals which recovered did not present immunity against later inoculations of anthrax.

Lingard⁵⁴_{Apr. 15} gives the following as the result of the inoculation of a fœtus in utero with anthrax: 1. When during the inoculation of the fœtus the mother's tissues are wounded and inoculated, she in turn becomes infected. 2. Sometimes the germs travel from the fœtus to the general circulation of the mother, from which they can be detected in the placental tissue. 3. There are cases when the fœtus alone is infected, and the mother receives immunity from the affection. In this case neither can the bacilli be detected in the placenta nor in the maternal tissues.

Metschnikoff²⁰_{Dec. 4, '88} gives an exhaustive report confirming his theory of phagocytes, and adds that there are cases where the infectious material is altered by the gastric juice or some other causes, the activity of the phagocytes being thus, to a certain degree, impaired.

Behring⁵⁸_{Apr. 12} finds that the attenuated form of anthrax presents no microscopical difference from the virulent form, but is quicker in growth and more resistant than the latter. He also concludes that the more virulent the growth the more *acid* it is, and *vice versa*; the more alkaline the blood-serum, the more difficult it becomes for the anthrax bacillus to grow.

Schmidt-Mühlheim⁵⁰_{July 12} solves the question of the anthrax bacillus producing spores in the meat of animals afflicted with this affection at the time they were slaughtered. Guinea-pigs were inoculated and died of anthrax. The thighs of the animals were denuded of the skin and placed in the incubator at 39° C. (102.2 F.). The surface of the flesh was soon covered with a whitish film, which was found to consist exclusively of anthrax bacilli, and which had already begun to build spores. The growth seemed limited to the surface of the tissues. Within the tissues there did not appear to be more bacilli than in such portions of flesh which had not been placed in the incubator.

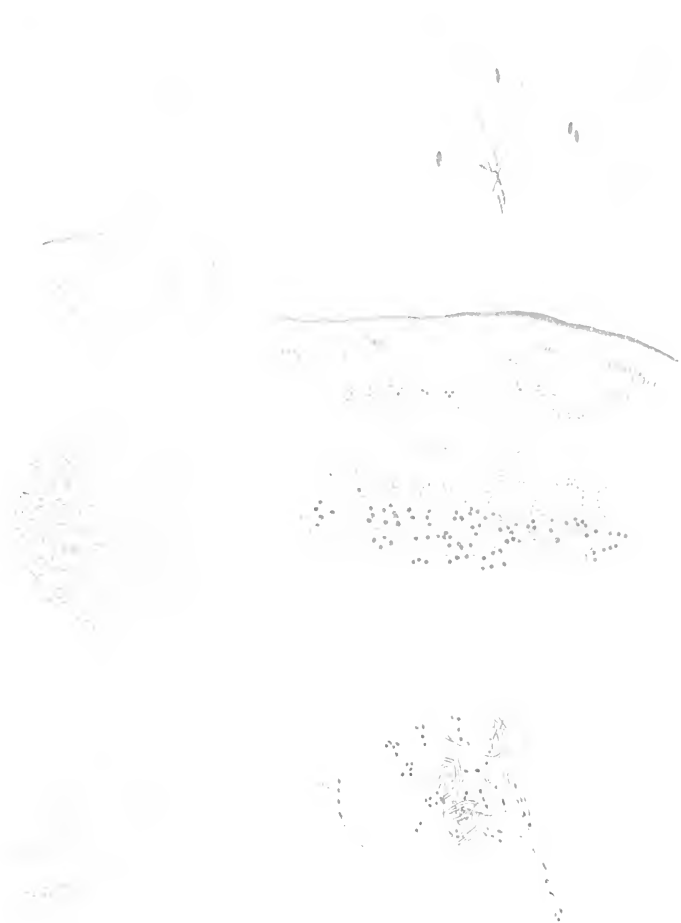
Chauveau ³_{Oct. 27} relates the complete attenuation of the anthrax bacillus by means of the persistent action of compressed oxygen. The bacillus gradually regains its first virulence on being deprived by degrees of its supply of oxygen, if an attenuated culture in bouillon be placed in contact with rarefied air. Different types of virulence may thus be gotten, which are: 1. Completely attenuated virus retaining vaccinating powers. 2. Partially revived virus, mortal to guinea-pigs and rabbits only. 3. Completely revived virus, highly virulent to sheep, etc. The first two types may be used as vaccine material for animals.

Petruschky ⁵⁸_{Aug.} says that frogs treated with lactic acid or hydrate of barium develop the spores of anthrax. In the case of the frogs treated with barium the growth of spores took place in one day. He found that carbonic acid gas is a powerful agent to prevent the formation of spores in the frog at the ordinary temperature.

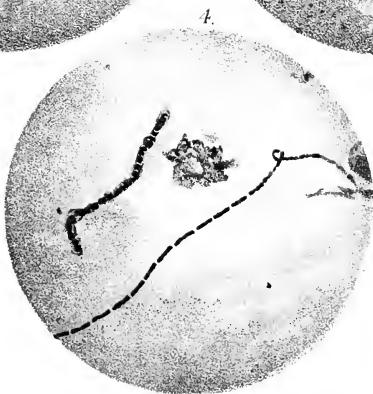
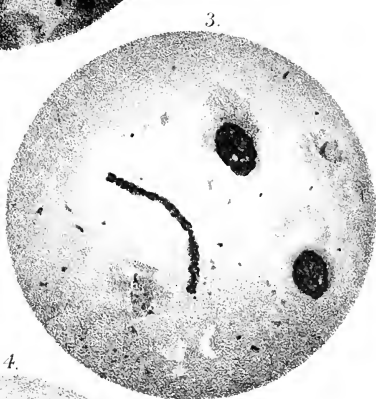
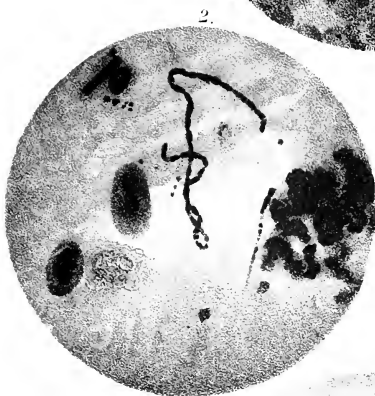
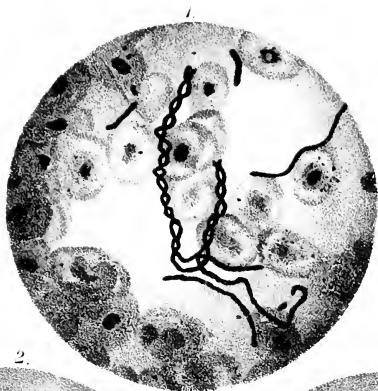
Explanation of Plate.—Fig. 1 and Fig. 2 came from earlier researches with spores from a potato culture, which were heated for two hours at 62° C. to isolate the spores. Fig. 1 shows anthrax threads grown from these spores at 37° C. in the lymph-vessels of the frog, which entered the circulation and killed the frog. Fig. 2. The same spores grown at a temperature ranging from 28° to 30° C., showing the degeneration of a long thread. The difference from Fig. 1 is marked. Figs. 3 and 4 come from preparations in the Hygienic Institute in Berlin. Fig. 3. Threads slightly grown, taken from the blood of a mouse, injected into a frog, and then kept near an oven. Magnified 1000 times, the degeneration is apparent. Fig. 4 shows the result of an infected piece of tissue remaining twenty-four hours in the frog's body at a temperature of 20° to 30° C. The bacilli are shorter and thicker, and are inflated near their extremity.

Foà and Bonome ⁵⁸_{Jan. 31} relate a most interesting case of septic infection of the hand, resembling malignant pustule, in which death soon followed, and on post-mortem microscopical examination of the blood, spleen, and liver a micro-organism was found which resembled the anthrax bacillus, but which failed to produce in subsequently inoculated animals the characteristic symptoms of anthrax. The authors conclude it was a case of septicæmia brought on by a short, aerobic bacillus, resembling somewhat the anthrax in character, and growing by fissure; it creates a pustule resembling that of anthrax on the skin, and altogether such general manifestations as are likely to cause it to be mistaken for true malignant pustule. The case is of such interest that the accompanying plate was thought deserving of reproduction.

Explanation of Plate.—Fig. 1. Fresh human spleen-pulp. Articulated threads. Fig. 2. Peritoneal exudate from a rabbit under whose skin a gelatin culture of the



Anthrax Bacillus. *Bacillus anthracis*.
Leptotheca anthracis.



Anthrax Threads and Spores (Petruschky)
Zeitschrift für Hygiene.

bacillus had been injected. A few hours after death. Fig. 3. Gelatin culture (20°) after a few hours. Zeiss, oc. III, obj. $\frac{1}{2}$. Fig. 4. Agar culture (30°) after two days. Zeiss, oc. III, obj. $\frac{1}{2}$. Fig. 5. Biceps muscle of man, very hæmorrhagic, with long and articulated threads between the muscular fibres. Fig. 6. Human skin near the pustule. In the epidermis are round, blistered places. In the upper layer of the skin and subcutaneous cellular tissue are numerous short rods and an infiltration of cells. Fig. 7. Masses of threads; from a rabbit injected subcutaneously with a gelatin culture of this bacillus.

Hankin²_{Oct.12} announces a new method of creating immunity against anthrax by means of an albuminose isolated from a bouillon-anthrax culture, after treating it with absolute alcohol and filtering through a Chamberland filter. The albuminose is gotten as a powder, and is redissolved for use. Rabbits and guinea-pigs treated with this had resisted the action of virulent anthrax cultures. Hankin's paper is, however, only a preliminary account of his investigations, and hence must be taken with reserve.

Clinical.—The shocking death of Hoffmann, pathologist in the General Hospital of Vienna, from anthrax,²²_{Nov.13} deserves special notice, as a warning in thoroughly sterilizing the instruments used in experiments with this bacillus. After using a hypodermic syringe for an experiment on animals he sterilized it through a spirit flame and administered himself an injection of morphia. Blood-poisoning followed and numerous gangrenous spots developed over his body. Inoculation of animals proved the presence of anthrax.

Reboul and Répin³⁵_{May 9} relate a case of malignant pustule of the right supra-clavicular region which proved fatal in three days—general infection being the cause of death. At the post-mortem, the bacillus was found in the blood and produced the typical affection in animals inoculated with it.

Two fatal cases²²_{Mar.6} seem to have developed in workmen employed in horse-hair factories, starting in 1 case from a pimple on the neck, which probably became infected from the poison existing in the horse-hair. The case of a horse-hair picker in Philadelphia recovered under treatment.¹⁰⁴_{Jan.5}

Johnstone²⁷²_{Apr.5} reports the following 3 cases as having been contracted by direct inoculation from diseased animals: 1. A Wesleyan missionary, while examining his horse to find out the cause of death, pricked himself; the horse having died of anthrax, he was thus infected and died a few days afterward. 2. A native of South Africa, who had taken the hide of an ox which had died of anthrax to sell, carrying the hide over a bare-backed horse,

rode home on the horse and chafed on the way, thus inoculating himself. He died also in a few days. 3. Another person, while treating an animal suffering from the disease, infected an abrasion on his hand, contracted the affection, and died within a week.

A case of malignant pustule in which general infection seemed to have begun is reported as having been cured by Troquart.¹⁸⁸
The affection first manifested itself as a pimple on the left upper eyelid, which soon swelled. High temperature and pronounced discoloration of the parts had at first pointed out the case as fatal. Murray¹_{Feb.9} reports 4 cases of malignant pustule, 1 of which ended fatally. In 1 case the patient had contracted the affection from carrying hides on his head; in another, from handling raw meat. In the 2 other cases the source of infection could not be found.

Sabatier,²¹¹_{Jan.21} contributes a valuable article showing the polymorphism of anthrax affections, and recognizes at least ten different appearances that can be taken for the initial stage of the affection, thus making it very difficult to establish a positive diagnosis.

Treatment.—We must distinguish the affection as (1) a general affection, or true infection of the blood with the anthrax bacillus, as in the fatal case occurring in Hoffmann, of Vienna, related above; and (2) an initial local affection, the so-called malignant pustule, which might secondarily infect the general economy.

No remedy or attenuated virus has as yet been found to check the progress of the first condition here mentioned, the attenuated virus being employed as a prophylactic measure.

With regard to the true malignant pustule, or local anthrax infection, there are a multiplicity of therapeutic measures, each appearing to have given excellent results when used in time.

Carbolic acid, in the form of spray or hypodermic injection, seems to have procured the greatest success. Boggs⁶_{Nov.16} reports a cure by carbolic acid injection in Verneuil's clinic, in Paris. Johnstone²⁷²_{Apr.5} reports that among the natives of South Africa, after a crucial incision is made in the pustule, applications of pure carbolic acid are made to the surface, and hypodermic injections of Condy's fluid. The antiseptic treatment is also applied internally, and for this, carbolic acid, oil of cajuput, quinine, and salicylate of soda have been found of most value. The amount of carbolic acid used amounts to 50 centigrammes ($7\frac{1}{2}$ grains) in 10 grammes ($2\frac{1}{2}$ drachms) of glycerin and water, injected about the infected spot.

Troquart recommends¹⁸⁸_{Aug. 11} the application of corrosive sublimate to the infected spot, and demonstrates that a cure was obtained after using as much as 20 grains (1.3 grammes) of sublimate, without causing any intoxication, but it acted as a powerful caustic, causing the whole slough to fall in a mass.

Cauterization with the actual cautery has been resorted to with success by Murray.¹_{Feb. 9} He reports three cases in which the actual cautery was first thoroughly used, and the wound was then filled with corrosive sublimate powder; a slough was produced, which fell away and the cases healed rapidly. Woolmer⁶_{May 11} has tried the different methods advocated, and firmly concludes that the actual cautery forms the safest and most convenient remedy, as producing less pain and suffering, and as being more efficient to reach the diseased tissues. Out of 40 cases in the recent epidemic in the province of Buenos Ayres the mortality was only 1, being a case which was not seen till the tenth day, and in which generalization had existed from the first.

CARBUNCLE.

From an unfortunate confusion in the French and English nomenclature, the French word *anthrax* has often been interpreted by a similar English word which conveys the notion of an affection due to the local or general invasion of the system by the bacillus anthracis. In point of fact, the French word *anthrax* simply means carbuncle; what is designated in English as anthrax, or malignant pustule, being known in French as *charbon*, due to infection by the bacillus anthracis.

A carbuncle, therefore, is simply a large boil or aggregation of boils. There is a hard, painful swelling of variable size. Suppuration is always present, and is due to the presence of the streptococcus pyogenes aureus. The streptococcus pyogenes albus is also found present, and if carbuncles as well as furuncles be really due to these two infective agents we have not as yet any sufficient explanation of the greater virulence and malignancy manifested by this microbe in carbuncular affections. Nothing has been done during the past year tending to throw any light upon the etiology of this affection, while, on the other hand, there is a wealth of reports of cures by various methods of treatment.

Treatment.—Carbolic acid, in the hands of Arnoz, Lande,

and Maurange,^{188 82} has given some remarkable successes. The following formula was used:—

R	Glycerin (neutral 30 per cent.),	
	Distilled water,	3i 5ss (15.0 grammes).
	Crystallized carbolic acid,	Mxlvi (2.8 grammes).

A teaspoonful of the above solution was injected into the inflamed zone at different points. That represented in all 8 minims (0.5 gramme) of pure carbolic acid; much pain was experienced at first, but before the next evening amelioration was quite evident.

Verneuil's treatment of directing a 2½-per-cent. carbolic acid spray into the inflamed area for an hour at a time twice a day has given admirable results in a case reported by Ryan-Tenison.^{2 July 20}

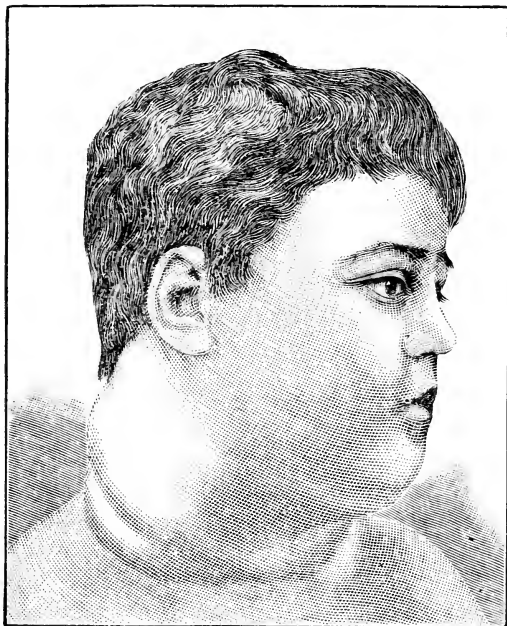
Tichomirow^{754 101} recommends painting the affected parts with tincture of iodine three or four times a day and using a cotton compress as a dressing.

An immense carbuncle of the back was treated by Dalton^{139 July} in the following way: After anæsthetizing, a crucial incision was made down to the healthy tissue and the flaps dissected up. As much of the necrotic tissue as possible was removed, and the wound was packed full of absorbent cotton saturated with camphophénique. The wound soon granulated. The author reports 2 other cases treated successfully in like manner.

O'Brien^{206 Nov. '88} advocates scraping. The carbuncle is thoroughly scooped out with a sharp curette (hæmorrhage stops of itself), and the cavity is packed with lint soaked in pure carbolic acid; this is removed, and iodoform powder is sprinkled over the surface and a woolen compress applied. The treatment has always been successful with the author, who recommends that the sooner the carbuncle is thus dealt with the better. McReddie,^{2 Jan. 5} of India, treats carbuncles exclusively by medical applications, without ever resorting to the knife. He uses a 1 to 40 carbolic acid solution or a 1 to 2000 corrosive sublimate solution, and afterward dusts the surface with a powder composed of equal parts of iodoform and zinc. The parts are then covered with lint soaked in carbolized oil (1 to 40). Dressings are renewed once or twice daily. Sloughs, as they become detached, are removed with forceps.

Sibthorpe^{2 May 18} says that of 15 cases under his care in the General Hospital at Madras 8 suffered from diabetes; of these only 1 recovered. Seven showed no signs of diabetes; of these only 1

died. Irrigation every third or fourth hour with warm perchloride of mercury solution was found to give the most satisfactory results. In the intervals the ulcers were covered with a pad wrung out of the same solution. Scraping was also resorted to in 2 cases; the ulceration left is said to have been the size of a soup-plate, but the patient got well.



HODGKIN'S DISEASE.
(*Provincial Medical Journal.*)

GENERAL LYMPHADENOMA—HODGKIN'S DISEASE.

There have been 5 cases of this rare affection reported during the past year, 3 of which occurred in England, one in Canada, and 1 in Philadelphia.

Although not etiologically, in the present state of science, a surgical mycosis, the peculiar hypertrophy of the lymphatic glands characteristic of this disease brings it sometimes for differentiation from scrofulous adenitis. Hence it has been thought proper to introduce its consideration in this department.

Called Hodgkin's disease, after the name of the physician who first drew the attention of the profession to it, there are various synonyms by which it is also designated: Pseudo-leukæmia, malignant lymphoma, general lymphadenoma. Buchanan²¹³_{Aug.} tells of a case in a young man, 15 years of age, who came to be treated for phthisis. Dullness at the apex of both lungs; temperature, 100.8° F. (38.2° C.); urine highly albuminous; specific gravity, 1014 to 1016; spleen much enlarged; abdominal glands greatly hypertrophied. Death in a few days. Railton²⁶_{June} relates the case of a little girl, aged 7, who came for treatment of enlarged lymphatic gland of the neck. The case was remarkable for its evolution. There was an insidious enlargement of the glands on one side of the neck proceeding for a year, and there followed, after a period of quiescence of about six months, a similar increase of those on the opposite side, but differing from the former by the great rapidity of their development and the elevation of temperature. In the course of two months this was followed by a generalization of the disease, as shown after death, by the enlargement of the axillary, intra-thoracic, abdominal glands and spleen.

Adler⁹_{Jan. 12} reports the case of a woman who, after an obscure illness with elevated temperature, developed large glandular masses in the neck, was anæmic and asthenic, and had a tendency to twitching of the muscles. Urine acid; specific gravity, 1025; no albumen. Patient soon died, in spite of palliative measures.

Stewart⁹_{June 22} exhibited at the Montreal Medico-Chirurgical Society a patient aged 22. He noticed enlargement of glands of left side of neck ten months previously; these continued to enlarge ever since; those in the axillæ also. No other groups of glands were appreciably enlarged. The patient was slightly anæmic, but there was no change in the absolute number of either the white or red blood-cells; neither could any change in the size or shape of the cells be determined. The case did not yield to treatment. Porter²_{Feb. 9} reports a case, aged 17, which presented three tense, non-fluctuating tumors on the right side of the neck. Constant fever, muddy complexion, gradual emaciation, weakness, hyperæsthesia over the whole body. There developed a number of lymphoid growths under the frontal periosteum and under the right eye. Patient soon succumbed.

TUMORS.

By MORRIS LONGSTRETH, M.D.,
AND
CHARLES BINGHAM PENROSE, M.D.,
PHILADELPHIA.

LYMPH-CYSTS.

L. Heusner⁶⁹_{May} reports 2 unusual cases of lymph-cysts caused by traumatism. The first occurred in a laboring man who stumbled and fell while carrying a heavy load on his back. Shortly afterward he noticed a swelling in the right inguinal region, which, in three or four days, increased in size so as to extend from the anterior superior spine of the ilium to below the great trochanter, and inward almost to the median line. Seven weeks after the accident the tumor was punctured, and $1\frac{1}{4}$ litres ($2\frac{1}{2}$ pints) of clear straw-colored fluid were withdrawn, which examination showed to be lymph. Notwithstanding the application of firm pressure, the lymph re-accumulated, and ten days later it was necessary to incise the sac and extirpate the inguinal lymphatic glands. At this operation, and subsequently during the changing of the first dressing, a large quantity of lymph escaped. This, however, gradually diminished, until, in five weeks, the wound was closed. In the second case a fall on the back was followed in five days by the appearance of a swelling in the right lumbar region, which, in twenty-four hours, attained the size of a goose-egg. Eight days after the accident the tumor was punctured and 40 cubic centimetres ($1\frac{1}{2}$ fluidounces) of lymph were withdrawn. It is probable that in this case one of the deep lumbar lymphatic vessels was injured by the fall, and rupture occurred several days later.

ENCHONDROMA.

Von Recklinghausen²⁰_{Oct.} reports an exceedingly interesting case of multiple enchondroma. Patient was 34 years old. Family history was good, with no trace of any similar deformity. His
(L-1)

health was good and condition normal until about the 6th year of age, when hard swellings appeared on the fingers of the right hand, which his relatives attributed to a bruise. He himself, however, stated that swellings had appeared on his fingers when he was between 3 and 4 years old, and that all the fingers of the hand had become affected about the same time. When 10 years old, similar nodes appeared on the thumb and index fingers of the left hand and on the toes of both feet. Two years later the second toe of the left foot was amputated, and about the same time the ribs and vertebral column became affected. From his 16th to his 22d year the growths rapidly increased in size; since then they have been stationary. The patient was in good general health, with all organs sound, and of average muscular development. The tumors of the hands annoyed him only on account of their unwieldiness and weight, and it was for this reason that he sought relief in amputation of the right hand.

HYDATID CYSTS.

An unusual case of hydatid cyst in Scarpa's triangle was operated on at the Hôtel Dieu, under the care of Reclus.²_{Apr. 20} The tumor had been observed for two years. It was hour-glass shaped, and measured over 2 inches (0.051 metre) in its vertical, and $1\frac{1}{2}$ inches (0.037 metre) in its transverse, diameter. The two segments were of equal size. The swelling fluctuated, was not pulsatile or reducible, and no aneurismal souffle could be detected. On palpation crepitation was detected similar to that felt in bursæ containing melon-seed bodies. Hygroma of the bursa of the psoas and iliacus tendon, dropsy of an empty and closed hernial sac, and suppurating tubercular adenitis were diagnosed. Pus was removed through a Pravaz syringe. When the cyst was incised hydatids escaped freely. The cyst-wall was partly dissected away and partly scraped with a Volkmann spoon. The tumor returned, and a second operation, with complete removal of the growth by dissection, was necessary before ultimate recovery. Verneuil has collected records of 9 cases of hydatids in the groin. Dupuytren nearly took a cyst of this kind for a femoral hernia. Gosselin has described 2 cases. An irreducible, fluctuating, non-inflammatory tumor in Scarpa's triangle may reasonably be suspected to be hydatid. There are, however, no constant symptoms of this condition.

CONGENITAL COCCYGEAL GROWTHS.

W. Alexander Mackay, of Huelva, Spain, collaborator, sends us a very valuable paper on congenital coccygeal growths, with the reports and photographs of 2 cases. The first was a child 3 months old. The tumor had increased rapidly in size from the time of birth. The growth was intimately attached to the rectum and the anterior surface of the coccyx. The second case was a child $2\frac{1}{2}$ months old. The tumor was here also firmly adherent to the rectum over considerable area and to the coccyx. Both patients recovered perfectly after operation, and a year later there was no recurrence of the growth. As Mackay says, these tumors demand complete excision. Any other treatment is worse than useless.

The microscopical examination of the growths in Mackay's cases shows one of the cystic cavities filled with granular material, probably mucin, in which small nuclei can be recognized. It is lined with an atrophied epithelial membrane, external to which is a layer of non-striated muscle and an outer connective-tissue coat, with fully-formed blood-vessels, arteries, and veins. This examination gives valuable support to Bland Sutton's theory^{Feb. 23, Mar. 2} of the nature of these congenital coccygeal tumors. He states that the histological features of these tumors are such as would be expected from the dilatation and aberrant growth of a piece of gut lined with cubical or columnar epithelium, and containing crypts and glandular recesses lined with similar epithelium, for they are made of cysts and duct-like passages lined with cubical epithelium.

A similar case of congenital coccygeal tumor is reported by Vincent.²¹¹_{Oct. 6} The child was $3\frac{1}{2}$ years old. The tumor was adherent to the rectum, and the coccyx and last piece of the sacrum were removed with it. Sloughing of the parts ensued and the child died. On section the growth looked like a cystic sarcoma. Microscopically, it was found to consist of a mesh-work stroma of different periods of growth, part being embryonic, part of fully-formed fibrous tissue disposed in islets, and alveoli. The cell-element situated within the spaces was epithelium of a glandular type. In shape they were polyhedric; the protoplasm was granular. They were arranged in branches, some being canaliculated. The latter, at points, seemed to become true glandular tubes, possessing at places dilatations, which were probably the origin of the adult cysts perceived by palpation. The walls of the cysts were

formed by a mucous lining and a basement membrane, between the two being a layer of stratified pavement epithelium. As the writer states, this growth looked like a cystic sarcoma. We, however, are of the opinion expressed by J. Hutchinson and Bland Sutton, that these congenital coccygeal tumors are not of a malignant character, and that their complete removal will result in permanent cure, as in the 2 cases of Mackay.

There is a strong superficial resemblance between these coccygeal tumors and spina bifida. The latter, however, generally affect the upper part of the sacrum, while the former originate between the coccyx and the rectum, and, bulging backward, displace and surround these structures.

CANCER.

The Causes of Recurrence of Mammary Cancer.—Heidenhain, of Berlin, ⁵⁴_{Aug. 15} has investigated the causes of the recurrence of mammary cancer. His researches have been most fruitful, and his conclusions are so valuable in connection with the operative treatment of this disease that we give them at some length. In 18 cases of cancer he subjected the extirpated gland to a careful microscopic examination, and in 12 cases found cancerous elements at the base of the growth, and prognosticated a recurrence of the disease. In the remaining 6 cases the base of the gland was found to be healthy, and he gave a favorable prognosis, which was confirmed in every case. From his investigations he formulates the following conclusions: 1. The pectoral fascia is very thin and its limits very uncertain, so that it is impossible to divide it from the muscle without leaving portions of the tissue adherent. This is especially the case in fat women. 2. In thin women the mammary gland is distinct, but in stout women small portions of the same are adherent to the neighboring fascia and muscle, and therefore it is very probable that, after amputation, portions of the gland will remain adherent. 3. It may be almost positively concluded that if a mammary gland contains even a small cancerous nodule it is diseased throughout its entire extent. The epithelial cells of the acini and the connective tissue become extensively infected. The lymphatics of the mamma carry these epithelial cells to some distance. Possibly one cause of recurrence of the disease is due to the acini, which remain after the extirpation. 4. In conjunction with blood-vessels lymphatic ducts stretch from the glands

deeply into the retromammary fat. In two-thirds of the cases examined cancerous metastasie were found in the lymphatic ducts. Through this channel the disease can progress until it reaches the fascia. 5. The pectoralis major is usually healthy when the tumor is in no way attached to it. It is, however, diseased when cancerous nodules are found adherent to its fascia, and also when the body of the tumor is attached to it. Probably the disease is introduced into the muscle through the lymphatic ducts. 6. Possibly, also, the contraction of the muscle, through movement, as well as the lymphatic stream, aid in carrying the infection to the surrounding tissues. A muscle infected with cancer seems to be diseased in its entire extent.

Guided by these conclusions, Heidenhain urges that, in cases of mammary cancer when the tumor is perfectly free and movable, the entire growth with surrounding tissues, and also the superficial portion of the muscle, should be removed; when, however, the growth is adherent to the pectoralis major, total extirpation of that muscle is necessary.

In connection with this paper, which contains the soundest surgical advice, it may be well to remember an observation of Creighton, to which Sir Spencer Wells calls attention in his Morton lecture on cancer. Creighton¹¹⁴⁵_{v. 63} shows that a special layer of glandular substance, more or less developed in the human axilla, corresponds to a conglomerate form of gland not previously described in one of the lowest mammalians, with an investment of unstriped muscular fibres in parallel order around each crypt, so as to constitute a basement membrane upon which the epithelial cells are seated. These sweat-glands differ in important respects from the ordinary skin-glands of man. They are not usually in the substance of the skin, but adhere to its under surface, lying between the skin and the axillary fascia, sometimes extending to the lateral and anterior regions of the chest. They are variously developed in different individuals, and must be regarded as a rudimentary organ, and subject to all the risks of such rudiments. Sir Spencer Wells reports a case in which he removed a tumor arising from this organ or from these sweat-glands, and states his belief that it is only necessary to direct more attention to this inquiry to lead to the recognition of a new and large class of tumors of the axillary and pectoral regions,—a class of tumors which must now

often be confounded with true tumors of the mammary gland. Creighton found in one instance perfect examples of these sweat-glands in intimate association with the breast structure.

In the Morton lecture on cancer and cancerous disease, Sir Spencer Wells²_{Dec., '88} gives most interesting statistics taken from the Registrar-General's reports for England, Ireland, and Scotland, which show the great increase in mortality from cancerous disease. In 1861 there were 360 deaths from cancer among each million persons in England and Wales. For the following twenty-six years there was a steady increase in the mortality until 1887, when there were 606 deaths among each million people. According to Fordyce Barker, the mortality from cancer in the City of New York has risen from 400 to the million in 1875 to 530 to the million in 1885.

Inoculation of Cancer.—Hanau, of Zürich, before the eighth German Congress of Internal Medicine, April 15th to 18th,¹¹³_{Apr. 21 to June 9} reported 2 successful cases of inoculation of cancer. He used pieces of cancer taken from a white rat, which he inserted into the scrotal tissue of two other rats. One animal developed general peritoneal carcinoma, and the other had carcinomatous nodules in the scrotum. Wehr made a series of experiments upon 26 dogs by taking pieces of carcinoma from the vagina or penis, and inoculating them subcutaneously through the shell of a trocar upon healthy animals. In one animal the tumor grew constantly until death. The autopsy showed carcinomatous infiltration of the tissues around the points of inoculation; also metastasis in the spleen and infected thoracic lymphatics. The infectious nature of cancer is thoroughly discussed by Rémond.¹⁰⁰_{Aug. 15, 17, 22}

Treatment.—J. Inglis Parsons²_{Apr. 27} reports 4 cases of cancer in which arrest of growth was caused by a powerful interrupted voltaic current. Three of the patients suffered from cancer of the breast, one from cancer of the cervix uteri. The technique of the operation is as follows: The patient is anæsthetized; the current is then passed through the tumor, and all the tissues for some inches around it, by means of fine insulated needles. A battery of 70 cells, with an electro-motive force of 105 volts is used. The intensity of the current is 10 milliampères increased to 600 milliampères. It is passed through the growth in various directions from 50 to 100 times.

P. Kraske³⁶⁵_{May 18} discusses the methods of bringing about the temporary cicatrization of open cancers which are beyond the

reach of a radical operation. He advises that the surface of the cancer be freshened by means of a sharp scoop or knife. A flap of healthy neighboring skin is then brought over the surface of the cancer and fastened by a few sutures. Skin-grafts should be placed upon the surface from which the flap was taken. He has used this method successfully in 3 cases. Lauenstein³⁴_{Jan.15} also states that he has successfully employed skin-grafting after reducing the exuberant excrescence by applications of savine and burnt alum, followed by methodical antiseptic dressings.

J. C. Munroe⁹⁹_{Sept.19} has a paper on "Escharotics in the Treatment of Malignant Disease." He reviews the history of this treatment of cancer, and gives a history of the escharotics which have been used both by quacks and physicians. His conclusion is undoubtedly true that an intelligent, skillful use of escharotics is capable of doing a great deal of good in cases not suitable for excision.

W. R. Williams⁶_{Aug.10} considers the rather rare disease of cancer of the male breast. His conclusions and remarks are based on the records of 100 cases. His observations show that 15 per cent. of all neoplasms originate in the breast, and of these only 1 per cent. originate in the male breast,—a good illustration of the law that obsolete structures have but little tendency to take on the neoplastic process. Cancer of the male breast may originate from the acini, the ducts, or the skin. Of the 100 collected cases there were: Acinous, 91; scirrhus, 88 (melanotic, 2); encephaloid, 3; tubular (cylinder-celled duct cancer), 6; cutaneous, squamous-celled epithelioma, 3 (melanotic, 1). The mean age in these cases was 50 years; the youngest age being 20. In 53 per cent. of the cases there was a history of previous injury to the breast. In 24 per cent. there was a family history of cancer. From these figures it will be seen that males are much more liable to the squamous-celled epithelioma of the skin of the nipple than females. This is in accordance with the rule for epithelioma of the skin in general. This variety of breast cancer is so rare in women that Billroth has gone so far as to deny its occurrence. Czerny has, however, since described a case.

SARCOMA OF OMENTUM.

P. Goullioud and J. Mollard²¹¹_{Aug.18} report a case of primary sarcoma of the omentum, with extension to the stomach and the

mesocolon. The case was operated on by Laroyenne: The growth was removed by abdominal section, and during the operation the transverse colon was separated from its mesocolon for a space of 30 centimetres (11.82 inches). The detached intestine was afterward sutured to what was left of the mesentery. The patient died of exhaustion six hours after operation. The detached colon was found in a condition of beginning gangrene. The nature of similar abdominal growths and their surgical treatment are fully discussed in the paper.

TREATMENT OF TUMORS.

Payson T. Huckins, of Los Angeles, Cal., ⁵⁰May, reports a case of removal of a very large, non-capsulated, fatty tumor of the neck, which completely encircled the neck, extending from the inferior maxilla to the sternum and from the occiput to the seventh cervical vertebra. Four distinct operations were required, and all the jugular veins were ligated except the internal on the left side. The patient, however, at no time suffered from any impediment to the circulation.

Two interesting cases in the London Hospital, under the care of Treves, are reported. ⁶Apr. In one the rectus abdominis muscle, with the corresponding skin, aponeuroses, and peritoneum, were successfully removed for sarcoma. The other case, a sarcoma of the pterygoid plate, is of interest, on account of the somewhat unusual, though good, surgical procedure of passing a *temporary* ligature or loop around the common carotid artery to control bleeding during the operation, and to be prepared for hæmorrhage after it. In this case the ligature was removed on the fifth day.

Mammillaplasty.—W. L. Axford ⁹⁶Apr. reports a novel operation for retracted nipples which are not amenable to any other treatment. The nipple is seized with the volsella and drawn out until the skin is well on the stretch. Beginning about $\frac{1}{8}$ inch (0.008 metre) from the apex, two curved incisions, inclosing a lune-shaped piece of skin, are extended out in the breast for $2\frac{1}{2}$ inches (0.063 metre), and the skin and fat down to the fascia removed. Three such lunes, radiating from the nipple, are made. A catgut suture is passed in and out, purse-string fashion, through the fascia, encircling the base of the nipple, and snugly tied at the point of entrance. This puckering of the fascia prevents any return of the nipple to its inverted condition. The skin is closed with silk suture.

GUNSHOT, PENETRATING, AND POISONED WOUNDS.

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AND

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A STUDY of the literature of gunshot wounds for the year is confined to wounds received in civil life, and reported, either separately or in small groups, by a large number of surgeons. Naturally, a large proportion of the cases reported terminate successfully, and reflect great credit to surgery or to the endurance of the patient. It is equally natural that a large number of gunshot wounds in civil life are not reported at all, for who of us are especially fond of reporting a series of failures? It is a question whether any views formulated of our experience in civil life will largely influence the future of military surgery. There are many reasons why such views should not influence military surgery. First, the nature of the weapons employed. Most wounds of civil life are inflicted by weapons of small or medium calibre,—chiefly by revolvers of defective workmanship. Such weapons are sold in the United States for from \$1 to \$3, and are easily accessible to all. From imperfect cylinders, with defective grooving and “choked” bore, the accuracy in execution and the initial velocity of projectiles are very greatly modified. On the other hand, military rifles and revolvers are of large calibre and perfect workmanship. At the present time, ordnance commissions are adopting rifles of smaller calibre than have been used heretofore in war; but the projectiles, although smaller, are made of hard lead and composition, or receive a steel mantle. They have a greater initial velocity, are less likely to be deformed by the tissues, and have great power of direct penetration. The influence of the new smokeless powder as an explosive will require study. Again, the environments of the civil and military surgeon differ very greatly. In large cities the man finds himself comfortably placed in a

hospital, with a surgeon ready to act within an hour from the time he received his wound. On the field it may be several hours before he receives any attention; then passes through the hands of the assistant surgeon and ambulance corps to the division hospital, where he may have to wait for more urgent cases. Are division hospitals in the rear of any army equipped for the successful performance of laparotomy in gunshot wounds of the abdomen, excisions of the knee, and trephining for projectiles in the brain? Laparotomy, at least, needs to be done in the division hospital, if done at all; for, if the patient be removed to the general hospital, so much valuable time has been lost that the operation had best not be undertaken. Again, the careful employment of antiseptics, which takes time, will require a greater number of operating surgeons in the division hospitals, and necessitate the carrying of a large amount of medical stores. In fact, to carry out the views of the civil surgeon, the ambulance and medical corps, in this country at least, would have to be reorganized. We have no doubt but that, in the event of a great war, from the demands of modern civil surgery, the medical service will be greatly modified. We should expect to see every soldier supplied with a compact antiseptic occlusion dressing, and that he should be instructed in its use in case of wounds. Further, there would, without doubt, be a wider application of fixative dressing in gunshot fractures, and the expectant plan, with antiseptic dressing, would be more carefully followed in wounds involving the joints.

GUNSHOT WOUNDS OF HEAD AND NECK.

Schwartz³⁵_{Apr. 18} reports 3 cases of penetrating wounds of the cranium by bullets of small calibre, the first case occurring in the practice of Berger. When the patient entered the service of Berger she was unconscious. After thirty-six hours she became conscious, but was aphasic and had a right hemiplegia. There was deep cyanosis, slow pulse, and vomiting. The wound was treated by careful antisepsis without exploration. The patient slowly recovered with encapsulation of the bullet, aphasia and paresis disappearing. The second case occurred in the practice of Liégeois. A boy was wounded by a revolver-ball of small calibre, 3 centimetres (1.18 inches) above and a little to the right of the root of the nose. There was an escape of cerebral matter amounting

to 3 grammes (46 minims). The wound was explored by the probe, locating projectile in the right parietal lobe, 10 centimetres (3.94 inches) from the external opening in skull. Wound was dressed with charpie and cold was applied. Recovery followed with enfeebled mind and evidence of cerebral irritation. The bullet was encapsulated. The third case occurred in the practice of Schwartz. The patient was comatose, suffered from paresis and a secondary encephalitis, but recovered very well after a prolonged course of treatment. Encapsulation of the projectile occurred in all of the cases. Schwartz agrees, however, with the conclusion of von Bergmann that it is exceedingly desirable to remove projectiles immediately from the cerebral substance, when possible, owing to the great danger of subsequent abscess, epilepsy, cephalalgia, and paralysis.

Franz Vogl¹¹³_{June 27} regards the prognosis most unfavorable in penetrating wounds of the brain when projectiles remain, although he relates where two encapsulated projectiles remained, respectively, nineteen and sixty-five years in the brain without creating disturbances. He also reports a case of revolver wound which, from symptoms, led him to believe there was a direct wounding of motor centres, left arm and leg, with possible lesion of internal capsule. The treatment consisted in application of light antiseptic dressing. Wound was not probed. After five weeks external wound became closed, and there were developed symptoms of compression with fever; however, dilating the external wound gave quick relief. Finally, the wound closed completely. There was a partial recovery from left hemiplegia. Dagron⁷_{Nov. 23, '88} reports a case of revolver wound of frontal lobes of brain occurring in the service of Le Fort. The injury was followed by encephalitis and death.

Joseph Prochnov,⁵⁷_{Jan. 27} in a report on gunshot wounds in general, reports 4 cases of penetrating wounds of the cranium occurring in his hospital service. Two died, and 2 recovered by encapsulation of the projectiles. In all the cases a purely expectant plan of treatment was followed. Still 3 other cases of penetrating wounds followed by recovery with encapsulation, reported by Berros and Verneuil, are referred to by Prochnov. He regards the extraction of projectiles from the brain as very desirable, yet there are great dangers in attempting removal. Vincent Richards,²⁰⁶_{July} in a sketch of the gunshot wounds of the cranium

occurring in the War of the Rebellion, 1861 to 1865, does the editor, Vander Veer, the honor of reporting a case wherein he removed from the cerebrum a conical ball of large calibre. The removal of the bullet was followed by recovery from right hemiplegia. The patient is now (1890) living in a fair condition of health, twenty-five years after the injury. I have yet the badly-shattered musket-ball. Surgeon T. M. Shah²⁰⁶_{Feb.} reports a case of bayonet wound of cranium followed by aphasia and facial paralysis. Under a purely expectant plan of treatment recovery followed.

GUNSHOT WOUNDS OF THORAX.

It can hardly be said that much advancement has been made in the management of gunshot wounds of the thorax during the year. Surgeons are generally unanimous in treating such wounds with absorbent antiseptic dressing applied over the wound with firm bandage, cold to the chest, internal administration of hæmostatics and anodynes, and complete rest in horizontal position. Bolder surgeons advocate, and to our mind very properly, in cases where hæmorrhage is excessive, the enlarging of the wound of entrance and exit, and either secure bleeding-points by ligature or by the firm plugging of the course of the wound with antiseptic gauze.

Mosetig-Moorhof¹¹³_{Jan. 6} reports a very interesting case of gunshot wound of the lung. A forest-keeper was wounded in the left chest by accidental discharge of a shotgun, and a fortnight later entered the hospital service of Winewater. At that time a large opening in the left axillary line, involving the sixth, seventh, and eighth ribs, was noted. Bridges of skin and sloughing tissue were cleared, when it was possible to look into the left chest and observe the collapsed lung, with an irregularly lacerated wound of the pericardium and diaphragm. Multiple drainage-tubes were introduced and the cavity irrigated thrice daily with a solution of permanganate of potash. Patient improved; wound gradually contracted to small size, and lung partially re-expanded. Two months later he entered the service of Mosetig-Moorhof. Left chest greatly contracted, and from a fistula healthy pus escaped. Wound was again enlarged, and from a fistulous tract in lung after dilation three large pieces of rib were removed. The wound was packed with gauze and patient improved. After weeks he developed symptoms of cerebral abscess and died. No autopsy was per-

mitted. F. Charlesworth⁶_{Dec. 15, '88} reports a case of double wound of chest, the first bullet entering left breast, the second penetrating right chest. He suffered from hæmoptysis for two days, then went on to complete recovery. Novatsky³⁵_{June 6} reports 4 cases of penetrating wound of thorax, in all of which recovery occurred under expectant treatment. One case is reported also as a wound of the pericardium. A young officer received a bullet wound of the left breast. He became immediately unconscious and collapsed. Heart's action very feeble, pulse 120 and thready. The normal heart-sounds became obscured or replaced by blowing murmurs. Hæmothorax occurred. Under the action of ice to the thorax and hypodermic injections of morphia, with careful antiseptic dressing, recovery took place. Novatsky refers to the unfavorable prognosis of penetrating wounds of the thorax during the Crimean campaign.

ABDOMINAL WOUNDS.

The prognosis of penetrating wounds of abdomen differs very greatly whether they be stab or gunshot wounds. Hence, each class will be considered separately, as far as practicable. Universally, the manner of the treatment of penetrating gunshot wounds of the abdomen is not established. Some advocate immediate, others delayed laparotomy, and still others a purely expectant plan of treatment. Statistical research here, as elsewhere, has done little to elucidate the question and establish the practice, yet, withal, there are certain elements in the management of gunshot wounds of the abdomen which have received much attention during the year.

What is the utility of rectal insufflation of hydrogen gas in the treatment of perforations of the digestive tube,—Senn's method? This procedure, devised by Senn, has many enthusiastic advocates. C. S. Briggs¹²⁰_{May} says: "The doubt and uncertainty that has hitherto prevailed in the diagnosis of penetrating wounds of the abdomen is now dispelled, thanks to the zeal and industry of N. Senn." J. H. Dunn¹⁰⁵_{Apr. 1} says: "Thanks to the genius of Senn, however, I hope we are on the way to mathematical accuracy in demonstrating and locating intestinal perforations."

David Barrow,⁶¹_{Jan. 15} referring to Senn's method, remarked: "We have now a reliable test for perforation of the intestines." Others have expressed themselves with equal enthusiasm.

On the other hand, A. T. Cabot, ⁹⁹_{July 25} after objecting to the method, very pertinently asks: "But what are we to do in the cases in which it does not succeed? Are we then justified in not doing an exploratory operation?" Furthermore, it should be remembered that perforation of the intestine is not the only injury wrought by penetrating wounds which it is the surgeon's duty to rectify. Serious lacerations of the mesenteric, other vessels, or organs, even without wounds of the intestine, may necessitate active surgical intervention. Cabot regards insufflation of hydrogen, after the abdomen is opened, a valuable accessory in locating wounds and making sure that all are closed. Braman ⁶⁹_{Aug. 1} doubts the utility of Senn's method. L. A. Stimson, ¹_{Nov. 2} in a very scholarly paper, concludes as follows: "In short, I believe the method as a preliminary to operation, and as a means of diagnosis, to be distinctly inferior to an exploratory incision in facility, efficiency, and security." In the discussion following Stimson's paper, Robert Abbe condemned injection of hydrogen gas for diagnostic purposes.

H. C. Dalton ⁸²_{Sept. 28} reports 2 cases of gunshot wounds of abdomen. In the first case the rectal insufflation of hydrogen was employed with success, so far as diagnosis of penetration of the digestive tube was concerned, but after the intestinal wound was closed the return of the intestines to the abdomen was accomplished with great difficulty, on account of gaseous distention. Lavage of stomach and the introduction of a cylindrical speculum into the rectum did not afford the much-vaunted relief. Senn has been similarly annoyed. The patient died. In the second case the penetration was not diagnosticated by the use of hydrogen, although skillfully employed. The operation was done and the patient died. Surgeons having experience in abdominal sections, such as for intestinal obstruction associated with great gaseous distention, will, from the difficulties already experienced, be exceedingly cautious in the gaseous distention of the digestive tube for the diagnosis of intestinal perforations. In our opinion, the rectal insufflation of hydrogen gas should only be employed after the abdominal incision has been made, and then for locating and making sure that all perforations are closed, and that it is of doubtful utility under such circumstances after six hours. None, however, hold a higher opinion than we of the value of Senn's experimental researches, and especially of the value of lateral

anastomosis by decalcified bone-plates rather than intestinal resection in cases of severe gunshot wounds.

L. A. Stimson,¹_{Nov.2} in a paper to which reference has already been made, after considering at length the management of gunshot wounds of the abdomen in New York, for a period of fifteen years in the hospitals, by Sandy Markoe, Bull, Weir, and himself, gives the following statistics and conclusions, which were not modified by the discussion of the paper in the New York Academy of Medicine: "The (incomplete) hospital statistics of New York City show, for an average period of ten or twelve years previous to 1885, 17 cases of recovery under non-operative treatment after gunshot wound of the abdomen supposed to be perforating. The integral statistics of three hospitals—the New York, Chambers Street, and Roosevelt—contain 23 cases with 15 deaths, a mortality of 65 per cent. The integral statistics of New York City since 1884 give 31 cases of laparotomy for gunshot wound of the abdomen with 25 deaths, a mortality of 80.64 per cent.; and the statistics of the three hospitals above mentioned give 16 cases with 13 deaths, a mortality of 81.2 per cent. In view of the apparently greater mortality after operation, it is highly desirable that any doubt as to the correctness of the diagnosis in cases recovering without operation should in the future be avoided if possible, and that with this object the track of the bullet should be traced to the abdominal cavity. Preliminary incision along the track of the bullet, or, in cases of need, in the median line, is the best and safest means at our disposal to recognize the presence or absence of wounds of the viscera. The relations between the number and severity of the visceral lesions and the size of the bullet or the early symptoms are not, in the majority of cases, sufficiently constant to guide us in the choice between operating and not operating. An improvement in the results of operative treatment may be expected if the operations are undertaken earlier (before the intercurrentence of peritonitis or septicæmia), and if their duration is shortened by rapidity of execution and by restriction of the search for lesions to the readily accessible portions of the intestine and to the probable course of the ball. While some may die through the overlooking of a perforation, fewer, I think, will be killed by the operation.

"In cases in which considerable time has elapsed since the

receipt of the injury, and in which the symptoms of septicæmia or peritonitis are present, with marked distention of the abdomen, an attempt to discover and close the perforations will almost certainly be fatal, and operative interference should be restricted to the establishment of free drainage of the abdominal cavity through the wound. In cases seen at an early period, and in which these grave symptoms have not been developed, the probable chances of success are sufficient to justify operation to repair the injuries. In the present state of our knowledge it cannot be said that either interference or non-interference should be the rule of practice, and the surgeon may be guided by his own convictions and feelings, whether they lead him to seek to do as much good or only as little harm as possible."

In a discussion of penetrating wounds of the abdomen before the Société de Chirurgie ³_{Feb. 6, 13; June 12} opinions differed very greatly. Reclus, considering the great difficulties of locating the lesion, pronounced himself a partisan of abstention, and advocated the employment of ice, opium, and antiseptic occlusion dressings. Many others were of the opinion that, on the whole, the expectant plan of treatment was preferable. Terrier expressed himself as a partisan of immediate laparotomy. In commenting on the success following laparotomy in America, he referred to the excellence of their ambulance system, enabling surgeons to treat cases with least delay. Berger, while not satisfied with the results of operative treatment, yet was a partisan of immediate surgical intervention. Nélaton advises immediate operation, and reported 2 cases, both fatal; yet he advises strongly against the expectant method of Reclus. Peyrot reported a case wherein he did laparotomy several hours after wound had been inflicted, and his patient lived two days. He was satisfied that if he had operated earlier his patient would have recovered. Chauvel agreed with Nélaton that operations should be done early, before the onset of peritonitis. Charvot ⁹¹_{June} at the close of a clinical study of penetrating wounds of the abdomen, offers the following conclusion: "In every hospital the surgeon should hold himself constantly in readiness for this operation. He should have room prepared, and should drill his *aides*. When a patient is brought in with gunshot wound of the abdomen he should be examined immediately, and, if perforation of digestive tube, immediate laparotomy should be practiced."

A. W. Barber ¹¹²_{Mar.} reports a case of wound of descending colon

by revolver-ball of large calibre. The patient had repeated hæmorrhages from rectum, but under a purely expectant plan of treatment recovered.

Carlos C. Granero⁷³_{Mar.2} relates a case of gunshot wound of abdomen by a bullet of large calibre. Wound of entrance 3 centimetres (1.18 inches) below umbilicus. Bullet lodged under false ribs in right side. A hernia formed at this point, and shortly after the patient passed the bullet per rectum and recovered without operation. J. H. Dunn¹⁰⁵_{Apr.} reported a case of shot wound of left groin. Two days later patient passed four buckshot per rectum. Under expectant treatment recovery followed. He also reported a second case treated by laparotomy. The wound of entrance was in the gluteal region and came out near umbilicus. The patient died, and at autopsy two unclosed wounds were found. G. E. Goodfellow⁴⁴_{May} reports 4 cases of laparotomy for gunshot wounds of the abdomen with two recoveries. His first case was operated upon July 13, 1881, nine days after receiving the injury. Six intestinal perforations were sutured and the patient recovered. This gives Goodfellow the priority in operations in America.

E. M. Moore, Jr.,²⁵⁹_{Apr.} reports a case of an officer wounded by an arrested man. The compressed-air cylinder of a spray apparatus demonstrated perforations. At the patient's request, laparotomy was done. Thirteen perforations were closed and 2 inches (0.051 metre) of small intestine resected. Patient recovered from ether, but died of shock twenty hours later. Arthur T. Cabot⁹⁹_{July 25} reports a successful laparotomy for stomach wound by a bullet of small calibre. F. B. Harrington cites a fatal case. Death was caused by shock. Berger³_{Mar.27} treated a case of gunshot wound of stomach by rest, ice, diet, and opium, with recovery. Twenty-seven days later passed bullet per rectum. Bramam⁶⁹_{Aug.1} reports a case of successful laparotomy for gunshot wound of colon and mesocolon, with great hæmorrhage. Vidal G. Thorpe, R.N.,⁶_{Dec., '88} describes a case where a bullet inflicted a flesh wound of thigh and entered abdominal cavity. An exploratory incision two days later was followed by death from internal hæmorrhage; intestinal canal not wounded. Greenshields²³⁴_{June} operated upon a woman for revolver wound of intestine, in a shanty in the remote country districts of Michigan. She recovered rapidly after suture, irrigation, and abdominal drainage.

T. A. McGraw⁹_{June 1} reported a case where an operation was done by him fourteen hours after the receipt of a gunshot wound of the abdomen. Adhesions had already formed, shutting off abdominal cavity. These were broken up and eight perforations found. They were closed by organized lymph. He resected 4 feet of the ileum. Death twenty-six hours later. C. E. Bell,²_{Mar. 16} alludes to a patient wounded by ball from revolver of small calibre. Seven perforations were found and sutured, wounded vessels ligated; irrigation here absolute. Twenty-nine days after injury passed bullet per rectum. David Barrows⁶¹_{June 15} reports 4 cases of laparotomy for gunshot wounds of the intestines, with one recovery.

PENETRATING WOUNDS OF ABDOMEN OTHER THAN GUNSHOT WOUNDS.

H. D. Reckerbach¹⁶¹_{Aug.} reports a case of stab wound with extrusion of small intestine. Further examination revealed wound of jejunum, which was closed by fine sutures of catgut. The intestines were washed with carbolized water and returned to abdomen; wound closed; recovery. Arthur T. Cabot⁹⁹_{July 26} cites a case of stab wound treated with laparotomy with recovery. F. B. Harrington reports stab wound, with injury and prolapse of omentum; recovery. Oshersovsky⁹⁶_{Aug.} treated a penetrating stab wound of abdomen, with omental prolapse, by washing omentum with sublimated solution; reduction and suture; recovery. W. H. Baldwin¹⁴⁷_{Aug.} reports a case where abdomen was penetrated and omentum wounded, followed by laparotomy and recovery. J. C. Sexton⁹_{Dec. 16, '88} relates a case of stab wound, with faecal extravasation within abdomen, treated by laparotomy, intestinal suture, and lavage, with recovery. Thomson⁶¹_{Oct. 26} reports a case of stab wound with extrusion of intestines. Intestines cleansed, wound enlarged and closed; recovery.

J. Venkataswamy²⁰⁶_{Mar.} reports a case of a child gored by a bullock, where, five hours later, he reduced a protrusion of bowel and omentum the size of a cocoa-nut after anointing it with carbolized oil. The wound was closed with horse-hair sutures. The child made an uninterrupted recovery. G. E. Lyndon²²_{Mar. 20} cites a case in which a young man was stabbed. There was great protrusion of intestine with wounds. Wounds of intestine were closed by Lembert sutures. No antiseptics were used; recovery. H. Méjasson²⁴³_{Apr.} reports a case of stab wound, with multiple punctures of intestine, treated by intestinal suture; recovery. Perrier²²_{Feb. 27} relates a

case of a young man brought to him with a stab wound of abdomen. An antiseptic occlusion dressing was applied, and patient did well. He was discharged from hospital in ten days, but a fortnight later, while in the street, was suddenly attacked with excruciating pain, and died in seven hours. The autopsy revealed two perforations half cicatrized. Frank Hartley¹_{Nov.23} reports a case of severe laceration and penetrating wound of the abdomen, with recovery after laparotomy and ligation of bleeding vessels.

GUNSHOT WOUNDS OF THE EXTREMITIES.

F. C. Bresler¹⁰⁴_{Aug.17} reports a case of gunshot wound of thigh followed by traumatic aneurism of femoral artery. Twenty-one days after injury the femoral was ligated on the distal and proximal side; recovery followed. J. Johnson¹_{July 27} gave an interesting account, from a medico-legal stand-point, of a gunshot wound disguised by a stab. A shot had lodged in the middle of Scarpa's triangle; then a knife was plunged into the bullet wound, completely obscuring it. The true facts of the case were discovered only on a second autopsy. J. McF. Gaston¹¹⁷_{Jan.} cites a case of pistol-shot of thigh, involving the femoral artery. After nine weeks he was called to operate upon a large hæmatocele. He ligated both proximal and distal ends of the artery. After turning out a large mass of clots, he washed the cavity with a solution of chloride of sodium and carbolic acid. Wound healed by granulation. Thomas Hayes²²_{Jan.30} reports a case of gunshot wound of axilla. The patient rested the muzzle of an old musket loaded with shot in the axilla, with the butt on the ground, and it was accidentally discharged, the charge of buckshot passing up and through shoulder-joint. The great vessels escaped. The head of the humerus, the acromion, and clavicle were shattered. From the extent of the injury no operation was deemed advisable. A water dressing was applied, and fragments of bone, cartilage, and tissue removed as separation took place. The wound healed without sepsis. After two months patient was able to follow his occupation as a farmer. F. S. Dennis⁷⁶⁰_{Nov.23} was able to locate and remove a bullet about the knee-joint by means of Girdner's telephonic bullet-probe. Dennis has a very high opinion of this instrument, when the use of the probe is indicated in gunshot wounds.

Little has been written concerning resection of joints for gun-

shot injuries. In a general review of gunshot wounds observed during the Tonquin expedition, received too late for a general review, not a single resection was done for articulated wounds of the knee. Only one resection has been reported in civil practice, and in that the indication was very obscure, although the case terminated successfully.

POISONED WOUNDS.

Semeleder, of City of Mexico, corresponding editor, contributes a *résumé* of a paper by Soriano on "Bites by Human Beings." The complication most to be feared is phlegmon. In certain cases, if proper treatment is not employed, erysipelas and extensive phlegmon develop exfoliation of the tendons or of the parts of the aponeurosis. Deep incisions are required, and amputations of fingers or limb may be required. Recovery is always slow, tedious, and painful; sometimes even death may result. An account of a death from a man's bite is given.⁸²_{July 20} A man involved in a fight was bitten through the thumb. Rapidly-spreading gangrene caused death in a few days. Joseph White,²_{Mar. 16} gives an account of a servant-girl dusting an Indian trophy, when an arrow fell, piercing her arm. She immediately passed into a condition of collapse, with slow and very feeble respiration. Under stimulants, with faradization, she recovered. White believes, from the symptoms developed, that the arrow was charged with curare.

A. Mueller⁵⁸³_{Apr. 15} very strongly advocates the use of hypodermic injections of strychnine in the treatment of snake-bite, claiming that the coma is dispelled. In some cases reported success followed the treatment. Large doses are given. In 1 case consciousness did not return until $\frac{1}{12}$ grain of strychnia (0.05 gramme) had been administered. The most popular remedy now employed in the treatment of venomous bites is a solution of permanganate of potash, 1 to 100. From the snake-infested portions of the United States come numerous reports of the successful employment, by the hypodermic method, of permanganate of potash. Its utility has not only been demonstrated in the treatment of bites from rattlesnakes, but for those of the viper, scorpion, and tarantula.

TRAUMATIC NEUROSES.

By E. C. SEGUIN, M.D.,

PROVIDENCE.

NOTHING of marked importance has appeared on this subject during the year. Many valuable cases have been placed on record, and there appears a universal disposition on the part of writers to view the subject from the stand-point first suggested by Putnam and Walton, amplified by Charcot and Oppenheim. The detestable terms, "railway spine" and "railway brain," are still employed by a number of authors, but apparently more with the object of clearly indicating the general classification of the cases they report than with the idea that they are proper scientific designations. It would do much toward finally settling the status of the topic if these terms, as well as the words "concussion" and "hysteria," were dropped. We know nothing of "concussion" beyond its meaning in physics, and the symptoms which resemble those observed in true hysteria were better designated, it seems to me, as *hysteroid*.

Nervous affections, organic and functional, following injuries and fright (physical and psychic shock) were discussed in several medical associations during the summer, viz., the Congress of the German Surgeons, the Association of Southwestern German Neurologists and Alienists, the International Medico-Legal Congress, the American Medical Association, and the Missouri State Medical Association. Evidently the subject is now receiving the attention its importance warrants in all civilized countries.

Semeiology and Diagnosis.—Dercum,⁸⁰_{May, Oct.} in a very thorough study of shock in its larger surgical relations, states that immediate but temporary paralysis may occur; hysteroid and neurasthenic states and also insanity may result later. Persistent paralytic symptoms are due to gross organic changes, produced by the accident (often the symptoms point to sclerosis of the cord). He insists on the importance of psychic shock, which may act alone, but is more

often associated with physical shock. The sequelæ of psychic shock are greater and last longer. Another late result of physical shock is (rarely) Pott's disease of the spine. In several of Oppenheim's cases (*vide* ANNUAL, 1889) generalized arterial sclerosis developed after the injury; and this occurred also in Kronthal's case, ⁷⁵_{June 1, 15} related *infra*. More authors report finding concentric limitation of visual field in one or both eyes, and hysterically distributed analgesia. Alopecia, more or less complete, is reported by Stepp, ⁶⁹_{Jan. 24} but, strangely, he does not state whether the patients (2) had not had syphilis. Oppenheim, ⁴¹_{May 13} in reporting 5 additional cases, remarks that the body symptoms are often on the same side as the cranial or other injury.

At last the importance of the diagnosis of malingering becomes apparent in European articles. On this side of the Atlantic we are, unfortunately, too familiar with this class of cases, fresh examples of which are brought forward by H. H. Smith, ⁶¹_{Aug. 10} Watson, Penrose, ⁶¹_{Aug. 13} and H. Judd, ⁶¹_{Feb. 22}. In Germany, Schultze ⁷⁵_{July 1} and Seeligmüller ⁷⁵_{Oct. 15} protested against Oppenheim's idea that simulation or malingering is rare (he did not meet with a case, and did not discuss the differential diagnosis in his monograph); they show that it is quite frequent and attempt the diagnosis, which they admit is sometimes difficult. The following table, including cases published in 1888 and earlier, is instructive on this point:—

AUTHOR	Fatal Cases.	Fraudulent.	Doubtful.
Oppenheim	37	0	0
Hodges	21	10	6
Rigler	28	7	13
Judd	15	12	?

In the International Medico-Legal Congress held in Paris, ¹⁴_{Aug. 21} Vibert and La Tourette made no reference to malingering, while this point received only slight attention from Motet. Oppenheim justly maintains the value of concentric limitation of visual fields and of hysteroid distribution of analgesia as against simulation.

The diagnosis as between functional (hysteroid or neurasthenic) and organic (sclerosis) conditions is more difficult still. Oppenheim ⁷⁵_{Aug. 15} advises that in obscure cases a positive diagnosis should only be given after observation of the patient in a hospital,—a

privilege which is denied to us in most medico-legal cases. Few malingersers could pass this ordeal. Wichman⁴_{July 1} discusses this point thoroughly, and relies upon the following symptoms as indicating the presence of organic changes in the central nervous system: Pupillary immobility, diplopia, optic-nerve atrophy, marked muscular atrophy, real bladder trouble, foot-clonus, and especially the clonus developed by tapping the tendo Achillis. [Incontinence of urine, so often mentioned in cases of this class, is a most easily simulated symptom, and its exact determination is difficult.—Ed.] He also admits that chronic hysteria may lead to (pass into) sclerosis. These are very much the same symptoms as those upon which Oppenheim¹²³⁵ relies. An interesting case is reported by Bernhardt,⁴_{May 6} showing that careful study of a case of "railway spine" may demonstrate that organic disease (tabes) existed prior to the accident. It is somewhat strange that the very important symptom, *amnesia*, partial or total, as a result of shock, has received no attention in the numerous papers of the last three years.

Perhaps the further study of this important subject would be advanced and made easier if the results of nervous injury were looked at from a broader stand-point, and I venture to hope that the following scheme of classification is not premature:—

Injuries to the nervous system without evident gross lesions; physical and psychical shock.	Immediate symptoms.	<ol style="list-style-type: none"> 1. Transitory paralysis. 2. Diabetes (mellitus et insipidus). 3. Amnesia (total or partial). 4. "Traumatic neuroses":— <ol style="list-style-type: none"> (a) Psychic (depression and hypochondriasis.) (b) Hysteroid and neurasthenic. (c) Local or neural.
	Late or secondary symptoms.	<ol style="list-style-type: none"> 5. Paralytic and atrophic symptoms (sclerosis and progressive muscular atrophy); dementia paralytica; epilepsy. 6. Pott's disease of the spine; cerebral tumors. 7. Malingering.

Etiology and Pathology.—With reference to the etiology or genesis of symptoms, Dercum's paper⁸⁰_{May, Oct.} on grosser forms of surgical shock is valuable as affording support to the views of other writers (Kronthal⁷⁵_{June 1, 15}), that vascular modifications may be preliminary to later changes in the neuroglia and nervous tissues. Kronthal, Oppenheim, Wichman,⁴_{July 1} and others insist strongly on the importance of fright or psychical shock. The last author believes that the active factors in genesis of traumatic neuroses are: (1) commotion of sensory and motor nervous elements; (2) vasomotor

effects of shock and fear; (3—not least) pure fright. Schaefer⁴_{Oct. 28} relates a case in which fear of impending collision and overexertion in stopping a train produced typical symptoms (mostly of cerebral neurasthenia) in an engineer. A similar case is reported by Dercum⁸⁰_{May, Oct.} in a woman who saw her child fearfully mangled. Chronic concussion (in railway employés) is not generally regarded as a potent factor, but M. Meyer⁴_{Feb. 4} believes it to have produced the hysteroid and neurasthenic symptoms which he observed in a baggage-master. The case is not as conclusive as the author thinks, because cerebral overstrain and anxiety about duties were very prominent, besides bad hygienic surroundings. Schaefer also is to be added to the now considerable list of observers who believe that the symptoms of traumatic neuroses are chiefly of cerebral origin. The injury may be very local and relatively slight, as shown by a case related by Bruns⁷⁵_{May 15} in which a blow with a hammer on the shoulder set up typical hysteroid hemi-symptoms (including concentric limitation of one visual field and reduced hearing on same side). This case bears out Charcot's and Oppenheim's statements that symptoms are often on the same side as the injury, no matter where this may be.

Meynert⁸_{June 14, 20, 27} has emitted a theory of the genesis of the hemi-symptoms (hysteroid),—observed after shock,—which is deserving of abstract only because of his authority. A pupil of his, Koliosko, has made injection preparations showing that an almost unnoticed artery, *arteria choroidea*, is of much more importance than generally supposed. Gray,¹²³⁶_{p. 534} however, describes it well, and states that it is distributed to the hippocampus major, corpus fimbriatum, velum interpositum, and choroid plexus. Koliosko states that it gives off nutritive branches to the tractus opticus, to the internal capsule, to the wall of the middle cornu, and to Ammon's horn. As it is a terminal artery, Meynert believes that spasm of this artery would account for nearly all the symptoms observed on one side of the body after concussion injuries and in so-called hysteria, viz., hemi-anæsthesia; amblyopia of one eye; loss of smell, taste, and hearing on one side; and a hemi-paresis affecting chiefly the leg, and not at all the face (the fasciculus for the face in the internal capsule being anterior to the territory supplied by the art. choroidea). This plausible theory is seriously invalidated, however, by a singular mistake which Meynert makes in stating that ischæmia

(or impaired nutrition) of the tractus opticus and of the caudal segment of the internal capsule must produce amblyopia of one eye. We now well know that such a condition would give rise to lateral hemianopsia, which is never observed in hysteroid or truly hysterical cases. He sharply criticises Charcot for believing that the above symptoms are of cortical origin, and claims that they are due to impaired function of the internal capsule. Another serious objection to Meynert's theory is that, as I believe, the nutrition of white fasciculi in the brain and cord is not very directly dependent upon arterial blood-supply, but much more upon the integrity of the trophic cells (or cells of origin) of the fibres composing the bundles. Meynert completely ignores the peripheral theory of hysterical hemi-symptoms, which has a good deal in its favor. The cases he relates have nothing to do with the subject; their pathology is quite different. He ends his article by a violent tirade against the therapeutic rise of hypnotism as demoralizing to the people.

Two other theories of the *modus agendi* of commotion or shock have been advanced. Benedikt⁴_{Dec. 24, '88}: By the shock, the loose connective tissue (neuroglia) supporting the nervous elements and blood-vessels of the nervous centres is easily loosened or disjoined; hence arise lesions of this tissue leading to secondary changes in nerve-fibres and vessels, partly through impairment of the lymphatic circulation between and around the elements. Brouardel¹⁴_{Aug. 21} advances the extraordinary theory that secondary or late symptoms are due to auto-intoxication or self-infection by ptomaines. In an excited patient he and Pouchet discovered a convulsing ptomaine; in a depressed patient they found an anæsthetizing ptomaine (!). No reference to data.

The scant pathological anatomy of the subject has been enriched by two autopsies. Kronthal and Sperling⁷⁵_{June 1, '15} report the following case: In a slight railway collision a brakeman, aged 42 (not syphilitic or alcoholic), received contusions on the right frontal region, chest, and abdomen; loss of consciousness. No immediate symptoms, but patient did not resume duty. In a few weeks the following series of symptoms appeared and progressed till death, four years later (1889): General failure of muscular power, impairment of memory, reduced knee-jerk, staggering gait, impotence (Romberg symptom), various paræsthesiæ, mental depression, palpitation, hypertrophy of the heart, rigid arteries (arterial

sclerosis); state of pupils and vision not mentioned. No anæsthesia; death from cardiac failure. Autopsy revealed extensive but irregularly-distributed arterial sclerosis (figures given), and some interesting lesions in the spinal cord; ganglion-cells of brain and nerves of brachial plexus normal. Throughout the cervical and dorsal parts of the cord there were irregular streaks or long islands of sclerosis in all the columns, but mostly in the posterior. A (recent ?) hæmorrhagic infarctus, measuring 2 millimetres (0.079 inch) in length, 640 μ and 112 μ in cross-section, was found between the commissure and the periphery close to Goll's column, in the mid-dorsal region. [This probably occurred shortly before death.—Ed.] In the spinal cord the small arteries were the seat of hypertrophic changes. The lumbar part of the cord is not described. The author believes that the general arterial sclerosis was set up by the "shock," and that this lesion in the spinal vessels led to the development of the disseminated sclerosis. [The report of this case is not wholly satisfactory, and the clinical examinations were made tardily and not thoroughly. We have no evidence that the morbid process had not begun before the injury.—Ed.]

The second case has not yet been published by the observer, A. V. Meigs, of Philadelphia, but is related pretty fully by Smith,⁶¹_{Aug.10} and corroborated by Penrose⁵ in the discussion. A sailor was dashed against bulwarks by a wave, striking back and head. Immediate paralysis and anæsthesia from clavicles down; bed-sores; high temperature; death in five weeks. Autopsy showed absence of all signs of fracture or dislocation of the vertebræ and of hæmorrhage. There was almost complete transverse myelitis or softening of the lower part of the cervical enlargement, with some ascending and descending degeneration. Penrose apparently witnessed the autopsy, and vouches for the integrity of the bones and ligaments. [This case is of very little value as related to our subject; others like it will be found in Erichsen's book. The spinal cord must have been at once injured in a gross way by forcible flexion of the spine.—Ed.]

Prognosis and Treatment.—A vast divergence of views exists between writers as to the prognosis of traumatic neuroses, and this may partly be traced to their opinions as to the relative frequency of malingering. In last year's ANNUAL it was stated (or should have been) that, while Oppenheim had no case of cure and only

6 cases improved out 32, Hodges reported 12 cures and 6 improved in a total of 21 cases. This year, Oppenheim, Wichman,⁴_{July 1} and almost all the Continental observers repeat the statement that the prognosis as regards life is not bad, but is very bad as regards complete restoration to health. In this country, Judd⁶¹_{Feb. 23} thinks that 12 out of 15 cases recover, but this is because he has met with a large proportion of malingerers cured by successful suits at law. As regards hysteroid, hypochondriacal, and neurasthenic cases it should be remembered that *complete* recovery is rare in the non-traumatic cases, which are common enough. Oppenheim, Wichman,⁴_{July 1} and other German observers apparently rely mostly on the use of electricity: galvanism applied to the spine and head in a mild form, and the faradic brush used vigorously on anæsthetic and parietic parts. Wichman rightly insists that galvanization should not be done by the patient or a lay assistant, but by a skilled physician. I entirely agree with him when he says that the domestic use of galvanization has done much to throw discredit on its therapeutic value; and in my own practice I have always insisted on its being done by a medical man; sometimes leaving faradization to be done by a carefully-instructed layman. Der-cum⁸⁰_{May-Oct.} advises early isolation and rest-cure. The spinal tenderness so often present is treated by Benedikt⁴_{Dec. 24, '88} with *pointes-de-feu*, hypodermic injections of carbolic-acid solution (2 per cent.) *loco dolente*, and galvanism. Arsenic and other tonics are recommended by various authors. Hypnotic suggestion (18 *séances*) produced unquestionable improvement in Kronthal's⁷⁵_{June 1, '15} fatal case, and in my opinion, notwithstanding Meynert's protest, is worthy of an extended trial in those cases in which probably many symptoms are produced by medical and legal suggestions, and by auto-suggestion. It seems to me that in an ordinary functional case of traumatic neurosis (hysteroid, hypochondriacal, or neurasthenic) the first thing to do is to isolate the patient, and then to carry out a systematic tonic treatment, with potent remedies and electricity, as demanded by special indications. The bromides, opiates, and stimulants, I am convinced, are injurious if used in a routine way, or for any length of time.

The Medico-Legal Question.—Nothing novel has been published on this matter; I can only call attention to the fact that simulation is very much more common in this country than on the

Continent of Europe, and that physicians should always be on the alert for malingering when called to a case of this class, and examine it with more than usual philosophic doubt.

SURGICAL DISEASES.

By LOUIS McLANE TIFFANY, A.M., M.D.,

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HYDROPHOBIA.

DURING the past year the sought-for microbe of rabies has continued to elude most careful search. Bacteriological study is advancing, however, with steady motion in many directions, and the announcement that the desired organism has been isolated may not be far distant. It is likely that chemistry will in the future play a most important rôle in hydrophobic study, and appears to have already done so in the hands of Anrep, of St. Petersburg,^{50 2} who says that he has isolated, from the central nervous system of rabbits suffering from rabies, a ptomaine possessing extremely poisonous properties. It is a distinct crystallizable body with a constant chemical formula. When injected under the skin in rabbits, in minute quantities, it gave rise to ordinary symptoms of rabies, while in larger doses it gave all phenomena of the advanced disease, ending in death. It seems very unlikely that a ptomaine should be present without a microbe to produce it, but we here approach a most suggestive and scarcely-trodden field.

Di Vestea and Zagari^{537 54} have conducted a series of experiments to investigate the transmission of virus along the nerve-trunks. They quoted Burdach as showing that in 2 cases in man virus in the course of the nerves from the bitten part was discovered. Inoculations made with virus into rabbits always gave positive results; in guinea-pigs not so constant, except when injections were made in the course of the median or vagus nerves.

Inoculations made into small nerves show that they transmit virus quite as well. Should the animal be killed before the appearance of paralysis, and the spinal marrow be examined, great change will be found in that part nearest to the inoculation. The concentration of virus will be greatest at that point. Transmissions seem possibly more certain through small than through

large nerves. The authors affirm that all cases of human hydrophobia in which the development of the symptoms was in relation with the seat of the bite, speak evidently in favor of the absorption of the virus by way of the nerves.

Welch,⁶¹_{May 18} in a communication to the Medical and Chirurgical Faculty of Maryland, reviews the subject of hydrophobia, and pays special attention to the transmission of virus along the nerve-trunks, and its abundant presence in the central nerve system, especially in the medulla. He states that it is very rarely transmitted to the fœtus through the placenta. The inefficiency of intra-venous injections and the absence of the virus from the blood lead to the conclusion that the virus passes along the nerve-trunks, although we have no information as to how this is accomplished. In view of the conceded high death-rate following bites on the head and face by rabid animals, the result leaves no room for doubt as to the efficiency of Pasteur's treatment, although it is not unfailing. While the nature of the infecting agent in rabies is not as yet distinctly proved to be a micro-organism, there can be little doubt of the fact, reasoning by analogy, that such is the case. It is probable, also, that a ptomaine is produced as in other infectious diseases.

The existence of the virus of rabies in the secretion of mammary glands of animals has been demonstrated very clearly, and attempts have been made to prove its passage into the placental circulation from the mother to the fœtus. Perroncito and Carita¹_{Sept. 21} have apparently been successful in their experiments. The latter inoculated a pregnant rabbit, and, by the end of her period of gestation, five days later, the animal was delivered of a litter, of which 4 were dead and 1 living. Four days later the mother died of rabies. From 2 of the still-born young 2 healthy guinea-pigs were inoculated, one of which died of rabies.

Bardach²⁹²_{v. 2, No. 1} has observed the following: A woman nursing a child of 6 months contracted hydrophobia. Four rabbits were inoculated with the milk; 1 died of rabies within eleven days; the 3 other rabbits died within sixteen days after inoculation. Further inoculations from these animals established the genuineness of the disease. The nursing child of the woman who died from hydrophobia was still healthy four and one-half months later. This demonstrates that had the resisting power of the child not

been greater than that of the rabbits the result would have been fatal. The experiment would have been more complete if the mammary secretion had gained entrance to the child's body, not by the alimentary canal, but by inoculation.

It is a recognized fact that the method of inoculation of the virus of rabies very materially influences the chances of infection. With a view to explain this variation, Helman^{262 22}_{No.1; Feb.27} undertook certain experiments. He found that rabic virus introduced into the connective tissues not only does not confer rabies, but may even act as a prophylactic. When the injection is made into the muscle infection is certain. He has never succeeded in finding the poison in the lymphatic glands nor in the blood of infected animals.

Rabbits will withstand the injection of the virus into the peritoneum. Infection appears to depend largely on the tissue involved.

It has usually been accepted that bites upon uncovered portions of the body were dangerous, mainly because the rabic virus was not prevented from gaining access to the bitten person by intervening clothing. Helman's investigations suggest another explanation, however, which modifies the popular belief.

The question of spontaneous cure of rabies is raised by Högyes,^{559 22}_{V.33, p.346; June 18} who expresses the belief that experimental researches alone can settle the matter. Out of 159 cases on which Högyes had experimented during three years, 13 cases ended in recovery. These were animals in which the injection only was made, and 7 on which preventive inoculations were performed before or after the injection with the virus. Högyes found the artificial immunity against rabies to last over a period of not less than eighteen months; also, that complete immunity against rabies could not be made hereditary. The outcome of all his experiments induced him to believe that the utility of Pasteur's inoculations could be regarded as a proved fact. It is well to remember, in view of the artificial immunity obtained by Högyes, that Desguin⁵²_{May 25} reports a case of rabies, the period of incubation of which was more than two years.

Peyraud¹⁰_{May 28} has published a short communication concerning a simulated hydrophobia induced by injection of tansy in the system. His conclusions are: 1. That essence of tansy injected into the veins induces a condition similar to hydrophobia or rabies.

2. After inoculation of rabies, tansy injected under the skin around the point of inoculation impedes the development of rabies.
3. Hydrate of chloral prevents the development of true rabies.
4. Essence of tansy injected during a certain time, in gradually increasing doses, produces a condition indisposing to the occurrence of true rabies.

Reports of a number of cases have appeared during the year in which marked resemblance to rabies is stated to have been observed. The following cases in print, headed "Rabies from Fright," are related ¹⁰⁵_{May 1}: Two sisters were bitten by a dog supposed to be mad. One went to Holland, and on her return, ten years later, she learned that her sister had died shortly after their separation. She remembered the bite and attributed the death of her sister to it, was attacked by hydrophobia, and died in a terrible paroxysm. Another instance is given of a magistrate whose dog died, apparently with no indications of hydrophobia, after having bitten sheep. The master, remembering that the dog had often licked his hand, became terrified, lest his dog might have rabies, and for many days was delirious. His common sense finally triumphed, however, and he recovered.

One can suppose that hysteria or fear, aided by a strong imagination, might take a form recalling to the mind of the observer an attack of rabies; but the converse of such a proposition—namely, rabies from fear—is too absurd to deserve comment. In this connection it will not be without interest to note the number of rabid animals recorded in France during the following years ¹⁴_{Mar. 3}: 1883, 182 animals; 1884, 301; 1885, 518; 1886, 604; 1887, 644; 1888, 863. No explanation seems to be given for this increase, and, in view of the agitation on the subject, one is tempted to wonder whether a highly-wrought imagination may not have had something to do with the number reported, as it probably has had to do with the number of patients seeking treatment at Pasteur's hands.

Victor Horsley, ²_{Feb. 16} than whom no one is better able to judge, supports Pasteur's claims, and pays high compliment to his success. In the lecture given in February, 1889, he accepts rabies as an acute specific disease, the virus of which behaves so exactly like a micro-organism that there can be no doubt that it is one, although the microbe inducing the disease has not, as yet, been

isolated and cultivated. His conclusions in the way of treatment are that Pasteur has succeeded in diminishing the percentage of risk in being bitten by a rabid dog from 15. to 1.36. and that this result is obtained by injecting a chemical protective substance.

In the way of treatment during the year there appears to be one new suggestion. Avila and Pena^{503, 77} record a complete cure of rabies by means of the American aloe (*Agave Americana* L.). A boy of the Province of Seville, aged 8 years, was bitten by a dog, February 18th, which next day showed symptoms of rabies and was killed February 21st. July 14th, the father brought the boy to the hospital on account of the great change in his disposition. He had become irritable and unsociable, ate and drank with difficulty and aversion. There then developed a characteristic picture of rabies, and all hope of recovery was lost by the 16th. On the morning of the 18th there was offered to the patient a piece of aloe-leaf, and the boy took it into his mouth and, almost without chewing, swallowed it, and then asked for more and ate it. By the evening of the 18th the nervous attacks were less strong, and on the 21st the patient began to answer questions, but still continued to demand aloe-leaves. On the 26th he found that the leaves were bitter and caustic. Recovery followed. Prophylaxis, now as formerly, offers the main hope of success.

At a meeting held in London, presided over by the Lord Mayor, in June last, the following resolution, moved by Horsley, was adopted: "That this meeting, whilst recognizing the value of Pasteur's treatment, and taking steps to provide for the treatment of persons who may hereafter be bitten by rabid animals in this country, is of opinion that rabies might be stamped out of these islands, and invites the government to introduce, without delay, a bill for the simultaneous muzzling of all dogs throughout the British Isles, as provided in the measure drafted by the Society for the Prevention of Hydrophobia, together with the establishment of quarantine, for a reasonable period, of all dogs imported."

Fairness requires the presentation always of both sides of a question, yet objections to the methods of Pasteur are few and far between, in England being largely confined to the *Provincial Medical Journal*.

Drzewiecki⁵⁹ considers the efficacy of Pasteur's method, and mainly cites statistics. Richards²¹ finds great fault with

Pasteur's statistics, and doubts the facts upon which they are founded. He objects strongly to the elimination from the mortuary table of patients dying within a fortnight of the completion of the inoculations or during the treatment. He says: "This is the most audacious of all the audacious shifts which have been made from time to time in the face of adverse circumstances by Pasteur or his partisans. If unfavorable data are to be eliminated because they prove that the treatment is useless when once the infection has taken place, of what value are the favorable data? The only certain point in regard to which is, that infection has not taken place." Statistics are like a generous and large-hearted Irishman,—anybody's friend. That the perfect success is due almost entirely to scare is sufficient evidence from the fact that (quoting Grancher's figures) the number of cases treated at the institute fell from 2682 in 1886 to 1386 in 1887. The average mortality from hydrophobia, it is said, being only 40 per annum in the whole of France, how could the death-rate to the number inoculated be anything but low under such circumstances?

Lutaud⁵⁹_{Mar. 9} is the arch-enemy of Pasteur's system. He claims to have kept an accurate record of the deaths due to hydrophobia, both before and since the Pasteur system came into vogue. This would show that more persons succumb to the disease now than formerly, and it is highly probable that some die in consequence of the treatment they are subjected to who would have survived if left unmolested.

Drzewiecki⁵⁹_{June 15} points out that, although the English Commission investigated 90 cases, in only 24 of these were the bites inflicted by undoubtedly rabid dogs, so that the number of 8 fatal cases were far in excess of the usual proportion of 5 per cent. The statistics of Kischenski are then quoted. From them it appears that of 307 persons bitten by unquestionably rabid dogs, 18 were bitten in the head (with 4 deaths), 90 were bitten in the hand (2 deaths), 25 on the feet (no deaths), 170 bitten through the clothes (1 death). To these must be added 1 fatal case in which the site of the bite is not recorded.

The mortality among those bitten by rabid wolves was 30 per cent. According to Pasteur it should be 82 per cent. In all the fatal cases the bites were very extensive and on the head. Of 17 cases bitten by rabid horses, 9 were admitted to hospital; none de-

veloped hydrophobia. Four were bitten by rabid hogs; none fell ill. Drzewiecki maintains that the inoculation did not prevent hydrophobia in man.

The summing up of professional opinion at the present time is fairly presented by the following: In speaking of an anti-Pasteur meeting in London, the *Medical Press* notes that, while all agree in their opposition, the objectors base their action upon distinct and antagonistic grounds. One attributed the true cause of rabies to muzzles. A right reverend bishop said muzzles were useless, as they did not prevent the dropping of saliva. An alleged physician adds his belief that no such disease existed in man. Thus far, the course of the anti-rabists has been upon lines strikingly parallel to those of the anti-vaccinationists, and, while there are undoubtedly some intelligent persons who do not accept Pasteur's deduction, the probability is that the opposition will finally be confined to the smaller collection of unreasonable cranks.

TETANUS.

The study of tetanus during the year has been largely in the direction of etiology and inoculability, and in both directions advance has been made. Lumniczer,¹¹³_{Mar. 10} after a short review of previous observations on the etiology of tetanus, discussed its bacteriological nature, and gives an account of 3 carefully-observed cases. In the first two of them, negative results followed inoculation and the tetanus bacillus was not found. In the third case inoculation with a piece of lint from the wound induced tetanus, and the characteristic bacillus, identical with that of Nicolaïer and Rosenbach, was found. Inoculation with tetanic blood was negative, but, with abscess-exudation, positive results were obtained. Lumniczer is strongly of the opinion that tetanus is to be ranked as an infectious disease; cultures from the lint imbedded in the wound produced the characteristic bacillus, and, on inoculation, gave rise to tetanus.

Brieger,⁴_{No. 15, '87; No. 17, '88} thinks that Rosenbach's bacillus very likely produces a ptomaine, and this idea is supported by the fact that the bacillus is found only in the neighborhood of the wound. Beumer and Peiper demonstrate the characteristic bacillus in the stump of the umbilical cord in the newborn child, and prove that inoculations therefrom into animals will induce tetanus. The pos-

sibility of communicating tetanus from one human being to another must be kept in mind; and a case is cited where the accoucheur, being in attendance upon a case of trismus, transmitted the disease to a woman in labor. Earth, as the habitat of the tetanus bacillus, is discussed by Johannes Raum, of Warsaw,⁵⁸_{Jan.31} who secured specimens from different parts of Europe, and finds that, even when kept in the laboratory from two to three years, the power of producing tetanus is not lost. Widenmann⁵⁸_{Apr.24} finds that earth- and wound- tetanus have the same cause, and thinks that the germ is domiciled near manure-heaps.

The question of the identity of traumatic and spontaneous tetanus is raised by Tizzoni and Lampiasi,³_{Apr.24} the former admitting that pure cultures of Rosenbach's bacillus were not pathogenic, and that all obtainable bacilli should be used together from a traumatic case in order to induct tetanus by inoculation. Lampiasi, starting from a case of spontaneous tetanus, obtained a virus which after two years is eminently capable of inducing tetanus. Lampiasi⁶_{Apr.27} believes the cause of tetanus to be a filamentous bacillus with a small terminal spore, although he has not been able to obtain a pure culture. He has inoculated various culture media with blood and spinal cord from a tetanic patient; from these cultures he has practiced inoculation, and has obtained tetanus in various clinical forms. Verneuil's well-known views on the equine origin of tetanus have been combated by several eminent veterinarians. LeBlanc,²⁴_{Jan.6} having made certain experiments, formulates his opinions as follows: The equine or bovine origin of tetanus is not proved, if in certain cases its telluric origin is probable; in the larger number it is very doubtful. Contagion by water, air, or dust is not to be admitted, and one is not very certain of the nature of the germs which are thought to be the single cause of this disease.

The influence of predisposition is not to be denied, and plays the principal part in the genesis of tetanus. Experimentally, its infectious nature has been demonstrated to a limited degree by inoculating altered tissues or earth from an infected region; practically, contagion of men or animals is not yet proved. It is useless to count tetanus among contagious diseases. Nocard admits as proved the power possessed by cultivated soil to give rise to tetanus, but does not see that this is due to horse-manure rather

than to that of any other animal, as the ox or sheep, and he strongly opposes the equine origin of tetanus, not because such may not be its origin, but because it has not yet been proved to be such. He suggests that the microbe of tetanus, like the vibrio of gangrenous septicæmia, may be innocuous in, and pass unchanged through, the alimentary canal of an herbivorous animal. Sarmani, of Italy, has discovered that the micro-organism of tetanus can traverse the alimentary canal of herbivorous or carnivorous animals, still keeping its infective power. Hence, manure becomes a potent source of tetanus dissemination. Lefour¹⁸⁸_{May 19} notes the fact that in the New Hebrides horses are unknown, yet tetanus is very common; this, however, is but negative evidence. Abadie¹⁷_{Dec. 18, '88} refers to Richelot's account of two patients affected with tetanus after ovariectomy, the disease appearing shortly after manure had been spread in the hospital court; also, Terrillon's report of the development of tetanus from a wound caused by a horseshoe soiled by manure. The cases of Richelot suggest that air may be the vehicle for transfer of virulent germs.

One of the most interesting, as well as important, investigations of the year was made in Koch's laboratory by Kitasato,²⁸³_{No. 29} and reported to the Eighteenth Surgical Congress in Germany. This admirable paper is worthy of all commendation; it may well serve as a model for searchers after truth, and bids fair to set at rest the question of "cause" of tetanus.

A young man of 23 having succumbed to tetanus, Kitasato obtained pus from the wound whence the disease started, and found the brush-shaped bacillus. Inoculation of the pus into rabbits gave positive results. To obtain pure cultures of the brush-shaped bacillus the following method was adopted: Pus from a tetanic wound was inoculated into blood-serum solidified and agar-agar, and exposed to a temperature of 36° to 38° C. (96.8° to 100.4° F.). Twenty-four hours later a few brush-shaped bacilli were visible, and twenty-four hours after this period a much greater number were present. The culture was then exposed to a heat of 80° C. (176° F.) during one hour, and then inoculated into mice, inducing characteristic tetanus. The spores in this culture were cultivated on plates, also in closed vessels containing hydrogen, and were kept at a temperature of 18° to 20° C. (64.4° to 68° F.). A week later the plates were sterile, while colonies were

present in the hydrogen vessels. The bacilli are therefore anærobes. Microscopic examination after the usual cultures showed a spore at one end of the bacillus. These undoubtedly pure cultures induced tetanus twenty hours after inoculation into mice, death following in two or three days. Kitasato was thus able to study the bacillus of Nicolaïer. It is anærobic, grows in hydrogen, and carbonic acid interferes with its development; the best culture media are peptonized agar-agar, feebly alkaline, and gelatin. During the liquefaction of gelatin, gas is evolved. Agar-agar is not liquefied; grape-sugar added to the culture increases the growth of the bacillus. Cultures of this bacillus have a repulsive odor, and the virus continues during successive generations. Under 18° C. (64.4° F.) cultures remain sterile; 100° C. (212° F.) wet heat destroys the spores. Ten hours' immersion in 5-per-cent. solution carbolic acid does not impair their virulence. Sublimate solutions (1 to 1000) destroy them in thirty minutes. Detached spores retain their virulence for months, especially when mixed with sterilized earth.

Tetanic manifestations first appear at the point of inoculation and extend to the rest of the organism. Post-mortem examinations of the lungs, spine, spleen, etc., are negative; hence, the bacillus rapidly disappears from the system after inoculation with pure cultures, and may act as through a ptomaine.

Much effort has been made during the year to discover the ordinary habitat of the tetanus bacillus. Verneuil¹⁰ Feb., Mar. remains firmly of the opinion that tetanus is of equine origin, and ably sustains his position in a discussion before the Academy of Medicine.

Verneuil accepts as proven that the disease is the product of a contagium vivum,—“the microbe being, as are all others, a special being, born, living, dying, reproducing itself in an independent manner, it is superfluous to affirm that it is produced by any other living creature, still less by inanimate matter,”—and formulates, among others, the following conclusions: “It is probable that several domestic animals are able to infect man, but satisfactory demonstration has been hitherto given only for solipeds. A wounded man can contract tetanus from the majority of neighboring objects which may touch his wound, but observation and experiment show that far the most dangerous objects are the horse with his imme-

diate surroundings, then cultivated earth and some of its products; hence arises conflict between the *equinist* and the *tellurist*. Accord would be easy if, in accepting the deductions, one would subordinate the one to the other, and recognize that if earth is able to induce tetanus it does so because it is soiled by the tetanized horse."

The telluric origin of tetanus has been investigated by Bos-sano ⁹² in a series of experiments carried on at Marseilles. Six _{Feb. 10} specimens of earth were obtained from dry localities, which had not been contaminated by putrefactive or organic matters for a long time, and used for inoculation of twelve cobayas; no results followed.

Ten specimens of earth were then taken from cultivated land, meadows, or roads, and, each being inoculated upon two animals, gave positive results. The inoculations were made in the right flank at the level of the hind limb. Four died of sepsis; the 16 others presented similar morbid phenomena, as follow: Rigidity of the limb adjacent to the seat of inoculation was observed two days after the inoculation, the limb becoming forcibly extended as this rigidity increased. By the third day the opposite limb was likewise extended and the animal assumed and preserved the dorsal decubitus; then appeared trismus, and, in the majority of cases, extreme dyspnœa, which increased until death closed the scene. A greatly-diminished quantity of urine was voided, which, as the bladder was found filled after death with highly albuminous urine, was doubtless due to paralysis of the vesical wall or spasm of the sphincter at the neck of that viscus. On the fourth day all symptoms were intensified,—general muscular spasms, etc. From this point the animal either fell into violent convulsions, ceasing suddenly in coma followed by death in several hours; or moderate spasms were followed by a severe one, in which the animal died. Diverging strabismus and dilated pupils were noted in some cases, for some hours prior to dissolution, particularly in the comatose. Rectal temperature descended after the third day and did not rise after death. At the point of inoculation a small quantity of pus mixed with earth is found, the former showing under the microscope, in nearly all cases, the characteristic slender bacillus with terminal spore. Numerous inoculations made with tissue other than that coming from the wound, liver, spleen, brain, and marrow have proved

negative, and the same may be said of urine and blood injected subcutaneously.

A further series of experiments was undertaken tending to show that attenuation of virus took place from successive inoculations, but no positive conclusions were reached. It is to be noted that all inoculations were made with pus containing many micro-organisms, no pure culture being obtained. Probably the only conclusion to be drawn from Bossano's work is that the power of inducing tetanus is possessed by soil from many localities.

Sibthorpe²⁰⁶_{Jan.} reaches very interesting conclusions, based on statistics from the Madras General Hospital and other sources. They afford food for much thought, especially in the direction of race peculiarity, the human animal being considered as a culture medium. The conclusions are as follow: 1. That modern investigation appears to show that tetanus is a specific disease. 2. Tetanus is one of the most frequent causes of death, after amputations and compound fractures, in Southern India. 3. Tetanus is more prevalent among natives of Southern India than among Europeans and Eurasians, as shown by the statistics of the General Hospital, the ratio per cent. of admissions among natives being .65; among Europeans and Eurasians, .05. This is borne out by Peat's experience in Bombay, where the ratios were 1.3 per cent. natives and .77 per cent. for Europeans. 4. Tetanus is met with all over Southern India, though it varies considerably in its incidence. It appears to be much oftener met with in towns on the eastern and western coasts than in those situated farther inland in the peninsula. Madras has a ratio admission of from .43 to .65 per cent.; Cuddalore, .77; Cochin, .45. The only exceptions to this are Vizagapatam, Mangalore, and Calicut, with ratios of .06, .107, and .06 per cent. In the more central and drier stations the ratios vary from .02 at Trichinopoly to .79 per cent. at Bellary. Several of these towns, which are far separated from each other, closely correspond in their ratios; for instance, Kurnool, .28 per cent.; Bangalore, .27; Madura, .28; Palamcottah, .26. 5. In Madras women and children suffer more from the idiopathic forms of tetanus and less from the traumatic forms.

	Admissions.	
	Traumatic.	Idiopathic.
General Hospital, nearly all adult males, . . .	160	31
Women and Children's Hospital, . . .	45	79

6. The ratio percentage of admissions would also seem to show that women and children suffer more, proportionately, from tetanus than men do. General Hospital ratio, .45 per cent.; Women and Children's Hospital ratio, .65 per cent. 7. Tetanus is less common in the cool and European-like climate of the Neilgheny hills, the admission-rate for ten years being only .08 per cent. 8. Tetanus is seen in Madras all the year round, but more in the dry and hot months; the month of May showing the highest number of admissions. 9. Exposure to chill appears to be a powerful factor in assisting the development of the disease. 10. The experience of the General Hospital shows that idiopathic tetanus most commonly follows exposure to chill of some kind; that traumatic tetanus most commonly follows contused or lacerated wounds which are inflamed or have sloughed, but that it may appear after a wound has cicatrized or even follow a strain or contusion when there is no breach of surface. 11. In the 45 traumatic cases which died and are properly recorded death took place in 34, or 75.5 per cent., when the disease had appeared within ten days of the injury, and in the 62 deaths which are properly recorded death took place before the disease had lasted ten days in 54 cases, or .87 per cent. 12. The longest period of the appearance of the disease after the receipt of the injury was forty-one days. 13. In idiopathic tetanus the symptoms sometimes set in suddenly; in the traumatic cases the symptoms appeared in one case fourteen hours after the receipt of the injury, and in another immediately after a fall. 14. The maximum duration of the symptoms in a traumatic case was forty-eight days, and the patient recovered. 15. The disease appears to be less fatal in Madras than in Calcutta or in Great Britain.

Ratio percentage of deaths to cases in Madras General Hospital,	. 67.0
“ “ “ “ Calcutta Med. Col. Hospital,	77.5
“ “ “ “ Guy's Hospital,	84.2
“ “ “ “ Glasgow Hospital,	87.2

16. The ratio percentage of deaths in cases in which the disease had developed in hospital is very high, being 89.8. In Calcutta 23 such cases were all fatal. 17. The mode of death is most commonly by exhaustion, next to that by spasms of the muscles of respiration. 18. Retention of urine is not an uncommon symptom, and may be a premonitory one. 19. The thermographic readings

are not so characteristic of the disease as they are of some other specific diseases; and in chronic cases there may be no variation from the normal just before death. 20. The symptoms may disappear for a time in chronic cases, and recur again.

Treatment.—Mackenzie²⁰⁶_{Jan.} states that from preventive treatment by narcotics given internally there does not appear to be much to hope, but, with the antiseptic treatment of wounds and great care in preventing or subduing inflammation by rest,—both mechanical and chemical,—there is much to be done in the prevention of this fatal malady. No drug has been proved to have a curative effect, but the combination of chloral and bromide of potassium, pushed, in sufficient doses, to their full physiological effect, seems to control the symptoms wonderfully, prolong life, allow of nourishment being taken, and to permit the elimination of the specific poison. Even if these desirable results are not obtained these drugs seem to modify the mode of death, as shown by the number of cases which ended in exhaustion instead of spasm. In the way of active treatment there has been, during the past year, the usual number of remedies suggested, of which the following are mentioned:—

Gunn²_{Mar. 2} reports a case of recovery from traumatic tetanus under doses of bromide of potassium and choral.

Sheen²_{Mar. 30} reports recovery from an idiopathic case under morphine injections.

Washington Ayer⁷⁷_{Mar.} advises a tobacco-poultice to the abdomen in idiopathic tetanus, and considers no other treatment necessary. In traumatic cases an infusion, 3 drachms to a pint of water, is employed as an enema; he thinks that one application will suffice. Morphine and chloral are also mentioned by him as excellent remedies.

Casati⁵⁰⁵_{May 26} has had favorable results in 3 cases with pilocarpine injected subcutaneously.

De Renzi¹⁴_{Mar. 6} has cured 3 out of 4 cases by absolute rest, obtained as follows:—

The patient's ears are filled with cotton-wool, and he is then put into a dark room away from any noise. A thick carpet covers the floor. The room is visited every four hours, a dark-lantern being carried by the physician, who gropes rather than sees his way. Food is liquid and poured directly into the mouth.

Constipation is disregarded, and ergot with belladonna used to abate pain.

Morange¹⁷_{Mar. 17} lost a traumatic case under chloral and morphine, and Stavridis²³²_{Feb.} saved 1 under similar treatment.

Pugh⁸⁶_{Feb.} gave 100 grains (6.5 grammes) of quinine, repeated it in eight hours, and his patient recovered.

Flammarion⁶⁷_{Feb. 28} reports a cure under treatment with acetanilide.

ERYSIPELAS.

Etiology.—The etiology of erysipelas is no longer considered doubtful. The streptococcus of Fehleisen, a micro-organism morphologically identical with the pus streptococcus, which it otherwise greatly resembles, is now everywhere regarded as the single and invariable causative agent of the disease. In the light of our existing knowledge it may be said that erysipelas, a local disease with marked constitutional symptoms, always arises from without; is always produced by the introduction of the streptococcus of Fehleisen through some wound, however slight, of the integuments; that the germ has no power of penetrating healthy skin, but may effect an entrance through any abrasion and, perhaps, also through scar-tissue; and that when once planted in favorable soil erysipelas rapidly supervenes, the local symptoms probably being brought about through the germ itself, the constitutional resulting from the produced ptomaines. Through Fehleisen's experiments the nature of the disease has been established for all time. He not only isolated and cultivated the microbe, but, by inoculation of the cultures, produced in animals and in man unmistakable erysipelas.

During the past year a very considerable amount of literature on this important subject has been published; but, with the exception of a single author, the chain-forming coccus of Fehleisen as an etiological factor has remained unassailed. The exception referred to is an article by Thiry, of Brussels,²⁸⁸_{No. 35}. In this paper the author denies the invariable importance of the microbe in the disease, divides the disease into various forms with as many causes, and gives to the streptococcus only a limited power in some cases of what he calls specific erysipelas. The paper is written from a clinical rather than a pathological stand-point, and does not depend on experimental work. Although the disease does present clinic-

ally various types, the fact remains that the streptococcus is always easily found when looked for in the lymphatic vessels or spaces of the affected skin area, can be readily cultivated, and will produce, when inoculated into healthy animals or man, the identical disease.

In view of the above fact it would seem that Thiry in his article hardly offers any considerable argument against the accepted etiology of erysipelas. Indeed, as a matter of fact, the streptococcus seems not only essential to all cases of erysipelas proper, but also to some conditions heretofore regarded as distinct by many writers. For, according to Verneuil and Clado,³_{Apr. 17} the same germ is found in cases of acute lymphangitis, from which they conclude, apparently with reason, that the diseases should no longer be considered as distinct, but rather that acute lymphangitis is only another form of erysipelas, to which it has been clinically so long related.

The probable action of the so-called phagocytes in resisting and overcoming the erysipelas coccus is interesting, and, although little is definitely known as to the manner in which these cells resist bacterial invasion of the tissues, B. K. Rachford⁵³_{June 1} states that Metschnikoff has found "that in fatal cases of erysipelas the cocci are never seen in the cells, but always free in the connective tissue and lymph-spaces, while the phagocytes themselves, especially in gangrenous parts, were found surrounded by cocci and completely destroyed. On the other hand, in non-fatal cases the cocci were found within the phagocytes, either as chains, as single cells, or as fragments." The chains and single cocci were found for the most part in the leucocytes, and the granular fragments in the connective-tissue cells; and Metschnikoff concludes that the leucocytes kill the cocci while the connective-tissue cells remove them after death.

Baumgarten and others, in opposition to this theory, that the fight between phagocytes and microbes occurs within the body of the former, say that the phagocytes have nothing to do with the destruction of the bacteria, and that the only part they play in the process is in taking up and disposing of the dead cocci after they have been destroyed. They cite the fact that in anthrax and other diseases the bacteria are known to die outside of the cells, and think it is so in erysipelas.

Rachford harmonizes the opposing views, and reviews the whole subject in the following conclusions:—

1. There is an uncompromising warfare waged by the cellular elements of the body (including the phagocytes) against the streptococcus of erysipelas.

2. The destructive influence of the parasites is exerted chiefly, if not exclusively, through the agency of ptomaines.

3. The increased biological activity of the cells surrounding the parasites results in the production of chemical products which exert a destructive influence on the parasites (Rippert and Holmfeld).

4. The contest between the cocci and the cells occurs outside, not inside, the protoplasm of the cells.

5. When the cells kill the cocci the phagocytes dispose of the dead. When the cocci kill the cells they feast upon their dead.

The same author discusses the question as to whether one attack of erysipelas confers immunity, and himself formulates the following law: "All self-limited parasitic diseases confer immunity, and the length of this period of immunity will be in direct proportion to the severity of the constitutional symptoms of the attack which conferred the immunity." He claims in support of this rather striking theory that, if the process be such as described in the foregoing conclusions, immunity must consist in the power of the cells to overcome the cocci, and the disease is self-limited, because in the contest the cells acquire the power of destroying the cocci. The disease is terminated by the production of a temporary immunity, which lasts a longer or a shorter time, according to the severity of the contest, and, if the cells are aided in their work by medication, the resulting immunity will be slight. Therefore, according to the severity of the constitutional symptoms, one attack will protect against another attack in the same individual. The author also thinks that in some cases the so-called "recurrent erysipelas" may result from streptococci which may exist dormant in the body after an attack until conditions favoring their development are furnished them.

There are few, however, who believe in such immunity. Most of the writers on this subject do not favor the idea of protection against successive attacks, and many are of the opinion

that a predisposition is excited by an attack of the disease. Whitaker⁵³_{June 1} says that many of the so-called cases of habitual erysipelas are not erysipelas at all, but rather "mere erythemas, simple dermatitis, carbuncles, drug eruptions, etc."

Agents used in the treatment of erysipelas depend for their value either on their ability to limit or check the spread of the erysipelas coccus, or, by improving the general condition of the patient, aid nature in overcoming the disease. Internal medicaments may be divided into two classes, tonics and specifics; and in like manner the local remedies may be considered as protective or soothing and parasiticide. The disease is to be regarded as a local one with a local cause, and the constitutional symptoms are to be considered as depending upon the entrance into the circulation of certain ptomaines produced by the streptococcus of the disease. On this account, it would seem that the tendency toward abortive or curative treatment directed against the cocci themselves at the point of local trouble, which in one form or another has received so much attention in the last two or three years, while still perhaps imperfect and needing additional study and development, indicates the proper way in which the ideal treatment of erysipelas is to be forthcoming.

In considering the value of the many new remedies so loudly extolled by their advocates as being invariably followed by good results, we must bear in mind the fact that the disease is naturally self-limited, tending in many cases to recover without special treatment on the fourth or fifth day. After reading the published reports on the action of many of the so-called specifics, both local and general, it is easy to persuade one's self that in many cases the disease might have done equally well under no kind of treatment whatever.

The idea of bringing the erysipelas coccus from its home in the skin lymphatics into direct contact with some germicidal fluid is, of course, one of the results of antiseptic surgery. To Kraske belongs the credit of first establishing this method of treatment, although, as now modified by Riedel and Lauenstein, it has more followers and is attended with better results. These surgeons make numerous incisions in the healthy skin some 2 inches (5 centimetres) above the border-line of the disease to prevent possible infection of aseptic tissues. After the operation, which is done

under rigid antisepsis, the wound is kept for several days constantly in contact with sublimate solution (1 to 2000). Prompt and decided improvement in both the local and general conditions follows, and the symptoms of erysipelas pass rapidly away. Only in exceptional cases, when probably the fence is made within the area of infection, has any erysipelatous process been seen over the lines of incision.

There are two chief objections to this method as ordinarily practiced,—one, that an anæsthetic is generally required; the other, that since it is required and an operation is to be done, some alarm will necessarily be created, enough often to cause the patient or his friends to refuse operative interference altogether. Because of these difficulties, Seibert, of New York, ^{Oct. 19, Nov. 23} has very ingeniously substituted scarificators on the order of the vaccination harrow, which do not cause much pain (it is only necessary that the blood-point should be reached; bleeding is not required), and may be used without an anæsthetic. He publishes 4 cases in which, after operation, a rapid and permanent cure resulted.

The most striking communication on erysipelas during the past year is from Wölfler, of Gratz. ³⁵⁷ ⁸ _{No. 14, '88; June 6, 14, '90} This author was for a time a follower of the Kraske method, but tried afterward ordinary adhesive-plaster strips, which were smoothly applied over healthy skin above the border-line of the disease, completely encircling or fencing off the diseased area. The adhesive strips, by pressing upon the skin lymphatics, control their channels and imprison, so to speak, the streptococcus in its own territory. The border-line of disease could be seen approaching the strip, reach it, and go off laterally, often affecting rapidly all the untouched integument surrounded by the strips, but would not go under the barrier except rarely and for some particular cause. The detailed history of some 18 cases is given. In facial erysipelas (12 cases) the redness never crossed the strips, and in all cases marked improvement was to be noted in twenty-four hours. The author states that in those few cases in which, from faulty application or other cause, the disease advanced at one or another point beyond the strip, the reddened projection never had the full color or virulence of the encircled area, but seemed always weakened and less active. In fact, 2 or 3 cases were cured before a second strip, placed some 2 inches (5 centimetres) above the first, was reached

by the advancing redness. Kröll, of Strasburg,^{116 Aug.} denies that the adhesive strips make sufficient pressure, and cites a number of cases successfully treated with rubber bands similarly applied. The subcutaneous injections of carbolic acid, first recommended by Hueter, are used by many with the best results, although the fact that they cause considerable pain, especially about the face, is a contra-indication to their use. By Rosenbach and his followers equally good results are claimed from the use of a 5-per-cent. alcoholic solution of carbolic acid applied constantly to the affected area after first thoroughly washing it with soap and water. Used in the same way, sublimate solution (1 to 2000) has its advocates. Ichthyol and resorcin are recommended as being nearly specific in the trouble. They are used locally, either in solution or in ointment.

Ulrich,^{373 No. 41} after a study of 89 cases, strongly recommends ichthyolized collodion. Tincture of iodine, tincture of iron, white lead, subnitrate of bismuth, and iodoform are a few of the many local agents loudly extolled.

Internally, Tison^{24 Aug. 4} recommends Duquesnel's cryst. aconitia in erysipelas of the face. He claims that it stops pain and checks the disease. The physiological action of the drug is cited to show its applicability to the condition.

Jaborandi as a specific has lost none of its ground. On the contrary, its advocates seem to be on the increase. On the other hand, the tincture of iron no longer holds the place that it did formerly, being now generally thought a good tonic, nothing more. Many, however, consider it still the most important remedy we possess.

While the disease is still attacked from many different stand-points and in many different ways, the literature of the past year shows a distinct advance in the line of operative or mechanical treatment, and it is in this direction that we look for further knowledge in regard to the proper therapy of erysipelas.

SEPTICÆMIA.

The question of septic poisoning is still very far from being a settled one. There are apparently two more or less distinct conditions included under the term septicæmia, and, according to Okintchitz,^{1011 p. 86} the two varieties have nothing in common beyond a

few clinical symptoms and morbid lesions. Of these two varieties, one, that of septic poisoning,—the septic intoxication of Hoffa,—is caused by the introduction into the system of some chemical product of decomposing tissues, the ptomaines of decomposition. Such cases are seen resulting from any decomposing collection in the body, as from senile gangrene, etc. The blood contains no micro-organisms, though, of course, they are abundant about the primary foci; and we are to understand that from decomposition bases or from produced ferments the intoxication is brought about. In the other form, that of septic infection, we have a direct introduction into the blood-channels, usually through the lymphatics, of the septic microbes, which there multiply and cause death. This is real blood-poisoning following often slight injuries, and in this form no decomposing material is found. Hoffa⁴¹_{May 20} discusses the question as to how the micro-organisms cause death. He rejects the theories of mechanical action, of exhaustion of the oxygen of the organism, and of the production of a peculiar virus, and says we are forced to an assumption of an active action on the part of the micro-organisms. That there are two possible ways in which the microbe may act in bringing about the fatal result,—one, its development and multiplication in the white blood-corpuscles in consequence of a ferment intoxication; the other, as in those cases where few post-mortem changes are found (especially no embolisms or thrombi), where we must assume the presence of a so-called toxine. Hoffa has isolated such a poison from the septicæmia of mice. The animal immediately after death was skinned and the uro-genital and intestinal tracts removed. The whole body was then minced in a machine, and, after the method of Brieger, a broth was prepared. From this he obtained, in all his experiments, a base with the composition $C_2H_7N_3$. This is an already-known product which Brieger has produced from decomposing fluids. It is not found in healthy mice. It is a powerful poison; 0.2 gramme (3 grains) injected into a rabbit caused its death in twenty minutes. He concludes that in septicæmia in man it is possible to assume a similar poison and the production of a toxic mycosis of the body. Okintchitz¹⁰¹¹_{p. 56} claims the presence in the blood in these cases of septic infection of a peculiar microbe which seems to be identical with Bordoni-Uffreduzzi's proteus hominis capsulatus. He, however, cites 2 cases, in 1 of which

only this organism was found, and in the other Fränkel's diplococcus and the staphylococcus pyogenes albus. One statement of this writer will be very generally indorsed, viz., that the subject fully deserves further extensive and careful researches, based essentially on the bacterioscopic examinations of the blood. The subject of immunity against bacterial infection, brought about by inoculations of soluble substances, the product of tissue-change, which was given such an impulse, if not inaugurated, by the work of Roux and Chamberland in the Pasteur Institute, has received further attention at the hands of P. Foà and A. Bonome in Turin.⁵⁸ These observers have obtained some distinct results with various kinds of inoculations, but especially in the case of the proteus vulgaris. They state that in animals, without exception, in whom injections were made of the blood from some animal of the same species just dead from the action of the proteus vulgaris, there was always produced, after a few days, an immunity against the peculiar action of the cultures of that organism. The injections were made of equal parts of the blood with sterilized *bouillon*, and were free from bacteria. The experiments are carefully reported and are convincing. In the spleen of animals dead from proteus great numbers of the bacilli are found, while in those made refractory by the preventive inoculations and killed one or two days thereafter numerous phagocytes were seen filled with the *débris* of the organisms, which were not to be found otherwise in the organ. Immunity against the action of the proteus vulgaris was also produced to a certain degree by inoculations with the blood of animals dead from the proteus capsulatus, but no influence was exerted by these injections against the action of bacteria of a different kind. Inoculations of the blood of animals dead from the diplococcus of pneumonia, as well as from other micro-organisms, seem also in the same way to produce a certain immunity against the cultures of the same organisms. The subject is one which, at the present time, has only begun to be investigated, and it offers a fertile field to the independent worker.

During the year there have been reported several cases of spreading emphysematous gangrene, notably one by Chas. Slater,⁶ July 20 of St. George's Hospital, London. In this case the gangrene rapidly followed a crushing injury of the right thigh, the wound having been in contact with gravel and earth. Death

resulted promptly. A bacillus, morphologically like that of the malignant œdema of Koch and Gaffky, was found, but the author was unable to identify it absolutely. There seems to be little doubt, however, that this disease does depend on the presence of the same organism which is found associated with malignant œdema, although, unfortunately, complete identification is, up to this time, wanting, owing to the fact that failure has attended every attempt to cultivate the bacillus. There may be mentioned, also, several cases of a generally superficial and sharply circumscribed gangrene, especially of the fingers, which have been produced by contact for a variable time with carbolic acid more or less strong. The process resembles a burn, and considerable retraction of the tissues has been observed on healing. This form of gangrene has been described by Max Kortüm,⁵⁷_{No. 62, '98} and more recently by various observers. Kortüm thinks the pathological action may be explained by the influence of the acid on the nerve-endings in the skin,—a trophic change. This explanation seems more likely because of the well-known local anæsthetic properties of the acid.

Metastatic Streptococchemia.—Meyer, corresponding editor in Naples, reports that Cantani⁵³⁷_{June} described a new form of disease, the so-called “metastatic streptococchemia,” which, although very similar to the septicopyæmia of Leube and Litten, and also to the septicopyæmia cryptogenetica of Jürgensen, differs from them in many highly important characteristics. In fact, in none of its cases have suppurations been observed as a consequence of the phlogosis; the course of the disease was always rather mild, and the prognosis was favorable. The exudations were always completely absorbed in a short time; the bones and eyes were never attacked by the pathological process; the general appearance of the disease never presented any resemblance to that of tuberculosis miliaris acuta; the fever was always low, and never presented those great oscillations observed by Jürgensen. We cannot, therefore, speak of a septicopyæmia in the sense of the authors above mentioned, nor can we say the disease is cryptogenetic, because it had its origin in erysipelas of the face. So, be it a special streptococcus, or the streptococcus modified, of Fehleisen, the author intends to call this disease “metastatic streptococchemia.” In the case in which he made the bacteriological examination, only one streptococcus was found,

which was not pyogenes. nor the streptococcus of Fehleisen ; it was, therefore, a streptococcus *sui generis*, which he considered to be the cause of the disease in the only case of this kind as yet observed. One microbe will scarcely be given the credit of founding a new disease.

ANÆSTHETICS.

By J. M. BARTON, A.M., M.D.,

AND

LAWRENCE WOLFF, M.D.

PHILADELPHIA.

HEWITT²_{Oct. 5} again calls the attention of surgeons to the advantage of having a number of anæsthetic agents at their command and not limiting themselves to one. He gives the indications and contra-indications for each anæsthetic. A similar article by him was quoted quite fully in the *ANNUAL* for 1889.

Mesnet¹⁰_{July 30}; ¹⁵_{Oct.} has recently, in the Hôtel Dieu, performed the operation of anterior colporrhaphy upon a patient in a state of hypnotism. She had previously been hypnotized several times, during which she retained her sense of touch, but lost her sense of pain. While hypnotized, she walked from her ward to the operating-room, removed her clothing, and laid upon the table. She talked during the entire operation, but showed no signs of pain. When she awoke she was not aware that anything had been done. Similar cases are quoted, ¹⁵_{Oct.} as amputation of the breast by Cloquet, in 1829; amputation of the leg by Loysel at Cherbourg, in 1844; of the arm by Joly, in 1845; of the thigh by Guérineau, in 1859; and of numerous operations upon Hindoos by Esdaile.

E. Haffter²¹⁴_{Jan. 1} states that persons who are sensitive to a hypnotic suggestion often fall asleep immediately after the adjustment of the chloroform mask accompanied by some soothing words. He now frequently simply "holds the mask before the patient's face, directs him to shut his eyes, to breathe quickly, and to quietly sleep." The desired effects are said to be sometimes rapidly obtained. Roth,²¹⁴_{Jan. 1}; ²⁶_{Feb. 1} after stating to a highly nervous patient who had a dislocation of the humerus, "You will fall into a quiet sleep under the influence of chloroform, and will feel no pain whatever," commenced the administration of the drug. After a "couple of whiffs" the patient began to make deep and even

respiratory movements, and was found to be sleeping quietly and soundly. Reduction of the dislocation was at once attempted, but failed on account of the muscular resistance. Roth remarked that "the reduction can only be effected when the muscles are relaxed." To his surprise, scarcely had these words been uttered when the muscles became soft and flabby, and the reduction was easily accomplished. Roth's order to "wake up" was similarly obeyed instantly. A case of hypnotism following the use of nitrous oxide gas was reported to the Medical Society of Lille by Radier,²²⁰_{Aug. 23} the patient remaining insensible for half an hour after cessation of the administration of the gas. During this time the respiration and pulse were excellent, but the patient could not be aroused even by flagellation. After half an hour Radier obtained responses, and made the patient walk, etc., at command. A few minutes after he completely and fully recovered. Radier regards the case as one of pure hypnotism provoked by the application of the mask.

Högyes, of Buda-Pesth,⁵⁵⁹_{No. 2 ; Sept. 5} after experiments on animals with the principal anæsthetizing agents, arrives at the opinion that these substances do not act simply by causing vaso-motoric anæmia and hyper-anæmia, but principally by forming chemical compounds with the protoplasm of the cells of the cerebral cortex and other centres.

P. Langlois and C. H. Richet,³_{Mar. 27} in the report of their researches on the influences of anæsthetics upon the force of the respiratory movements, determine that it is not the inspiratory movement that is affected as much as the expiratory. The animals inspire with a resistance of 15 to 20, and even 25 millimetres of mercury, when if the pressure of expiration is only 10 millimetres it suffices to produce asphyxia. The movement of inspiration is an active one, while the expiratory movement is purely a passive one, due only to the elasticity of the respiratory apparatus. Under the anæsthetic the animal is unable to make any voluntary efforts at expiration. In surgical anæsthesia extreme care should be taken that the movement of expiration should not be interfered with.

Benjamin Howard,²_{p. 1455, '38} in a paper read before the Medical Society of London, suggested that the usual cause of death in surgical anæsthesia was due to the valve-like action of the epiglottis, which, falling backward, completely closed the laryngeal opening, rendering abortive all efforts at artificial respiration. He

maintains the following: 1. "The epiglottis falls back in apnea and closes the glottis; the first thing in order and importance is the elevation of the epiglottis. 2. Traction upon the tongue, whatever the force employed, does not and can not raise the epiglottis. 3. The epiglottis can only be raised by extension of the head and neck. 4. The full effect of extension can only be secured with certainty by making it as directed. 5. The method of making extension is as follows: Having, by bringing the patient to the edge of the bed or table, or by elevation of the chest, provided that the head may swing quite free, with one hand under the chin and the other on the vertex, steadily but firmly carry the head backward and downward; the neck will share the motion, which must be continued until the utmost possible extension of both head and neck are obtained. Sometimes a slight elevation and extension of the chin will at once check stertor or irregularity of breathing, but the extension, which can in no case do harm, should always be rather more than appears necessary. It should never be forgotten, however, that the full effects of extension, as above described, can be secured with certainty only by making the extension complete as directed." Howard gives full anatomical reasons as the explanation for this manipulation. Martin and Hare,⁹_{Mar. 2} as the result of observations and experiments made by them upon both the living and the dead body, show that, while Howard's method did what was claimed for it, it was by no means the only or most desirable method of producing this result. They regard the epiglottis as rarely obstructing respiration, as the symptoms of such obstruction are rarely if ever noticed in fatal cases. These observers also showed that, while traction applied to the tip of the tongue produced no effect on the epiglottis, traction or forward pressure exerted upon the dorsum of the tongue, posterior to the anterior half-arches of the palate, at once carried the epiglottis far forward.

They objected to Howard's method on the ground that by it the soft palate is strapped tightly over the dorsum of the tongue, so that in place of mouth breathing the patient has to depend for air upon the nasal passages, which are scarcely sufficient at best, and are subject to all degrees of obstruction by congestive swelling or abnormal formations. They consider that the obstruction caused by the epiglottis or the base of the tongue is best removed by

pushing forward the lower jaw by force applied from behind and moderately extending the head. Foulis³⁶_{Aug.} suggests pressure to the back of the tongue by means of a spoon or fork for removing the obstruction caused by tongue or epiglottis. In case of threatened death from obstructed respiration, artificial respiration being instituted, moderate extension of the head and pushing forward of the lower jaw would be first indicated; this failing, the tongue should be drawn forward by a tenaculum inserted into its base, or pried forward according to the method of Foulis. If the obstruction still is unrelieved, tracheotomy or intubation is necessary. The method of Howard has been tried without success by Weir,⁵⁹_{Feb. 23} of New York. In his own person he found that it impeded respiration.

CHLOROFORM.

Diakonoff, of Moscow, Russia, corresponding editor, reports that Mentin,⁵⁸⁶_{No. 14} in an article "On Chloroform Sold by Druggists," states that he analyzed the products of a number of firms, the names of which he mentions, some of whom obtained the drug from chloride of lime and some from chloral. Not one of the chloroforms examined by him boiled at 60° or 61° C. (140° or 141.8° F.), as required by the Pharmacopœia, but contained portions that boiled about that point, this depending upon the admixture of alcohol. On evaporation none of them were entirely volatilized. They all left an oily or solid residuum, which had a disagreeable odor and exerted a deleterious effect upon the nervous system, producing malaise and headache.

P. Muselier,⁵⁵_{Aug. 3} before the Surgical Society of Paris, also called in question the purity of the chloroform used. Its rapid decomposition when kept, resulting in the development of hydrochloric acid and chloroxycarbonic gas, which are irritants to the respiratory passages of the operators as well as the patient. Reynier⁴¹⁹_{No. 8} confirms the statement, and adds that thus decomposition occurs even in bottles that have not seen the light.

Attention has been called by von Iterson,⁴_{Apr. 1}⁶_{July 27} Sterson, of Leyden²²_{July 17}; Fischer, of Carlsruhe⁴_{Apr. 1}⁶_{July 27}; Zweifel, of Berlin⁴_{Apr. 15}; Paterson, of Cardiff,¹⁵_{June 6} and others²³⁵_{Dec. '88} to the irritating effects of chloroform vapor when it is administered where gas-jets are burning. It produces irritation in the throat and lungs, embarrassed respiration, and occasionally nausea and vomiting in patient, operator,

and assistants. In some cases the irritation was so great that the operation had to be postponed. Zweifel⁴_{Apr 15} states that on several occasions while opening the abdomen by gas-light the atmosphere of the room was obscured by a white cloud; this was followed by the irritation mentioned, which was sufficient to produce in some of the patients bronchitis and pneumonia, in one case resulting fatally. This irritation is probably due to the actual combustion of the chloroform vapor while passing over the gas-jet, producing free chlorine, hydrochloric acid, trichloride of carbon, and possibly other chlorides and ammoniacal compounds. Wolff's experiments (J. Aitken Meigs, Philadelphia Medical Society) show that in a pure and dry atmosphere the chloroform vapors are not decomposed by the flames of gas-light. The same vapors, however, under similar conditions with an admixture of ammonia thereto, give rise to the irritant and noxious gases above mentioned.

Dastre³_{Sept. 23}; ⁶¹_{Oct. 19} classifies the fatal accidents resulting from the administration of chloroform as follows: Primary syncope, respiratory or cardiac; secondary syncope, toxic apnœa. In the first class, death results from the first inhalations (initial shock); this occurs from reflex cardiac syncope in nervous, impressionable individuals weakened by suppuration or hæmorrhages, or in individuals, otherwise healthy, who suffer from irregularity of the heart's action; or they arise from reflex apnœa under analogous conditions.

In the second class (secondary or bulbar syncope) narcotism is more advanced; the heart's action may be arrested suddenly or gradually; the arrest of respiration may be slow and progressive or sudden from tetanic spasm of the glottis. The third class of cases comprises those of fatal intoxication in which the agent has been administered too freely or for too long a time and the nerve elements have lost their vitality. In this form of chloroform poisoning there is a destruction of mechanism which seems to involve derangement of the entire respiratory apparatus. The real danger in the administration of chloroform is from the effects produced upon the heart, and not from those upon the respiratory organs. In the case of heart failure we are practically without resource, while in the case of respiratory insufficiency we have a remedy in artificial respiration. In opposition to the generally-accepted opinion, the arrest of the heart's action is a phenomenon of excitation and not of paralysis. In the majority of cases it is the stimulation of the

inhibitory cardiac apparatus that is concerned. Section of the two vagi nerves would constitute the theoretical remedy. Practically we arrive at the same result by the administration of atropine. Atropine, however, should not be administered alone on account of its excitative tendencies, but should be combined with morphine. The action of the combination of atropine, morphine, and chloroform has been experimentally tested in dogs, who are infinitely more subject to chloroform accidents than man. In the laboratory of the Sorbonne one dog in three was formerly lost under chloroform. During the last ten years all the dogs have been anæsthetized by this mixed method, and in hundreds of cases of narcosis there has not been a single death. This mixed method has also been used in human surgery by Aubert and his colleagues at Lyons,⁷⁵¹_{Apr. 31, '88} who make a hypodermic injection from fifteen to thirty minutes before the operation of $1\frac{1}{2}$ cubic centimetres (24 minims) of the following solution:—

Muriate of morphine,	. . . . .	10 centigrammes (gr. iss).
Sulphate of atropine,	. . . . .	5 milligrammes (gr. $\frac{1}{2}$).
Distilled water,	. . . . .	10 grammes (℥iiss).

The advantages, according to Aubert, are: (1) safety; (2) the great rapidity with which sleep is produced; (3) the absolute repose of the patient; (4) the quick return of consciousness; (5) the absence of vomiting. The number of instances of its employment now mount up into the thousands, without the occurrence of a single accident.

Robert Ostertag²⁰_{Nov. 2} deduces the following conclusions from a large number of experiments made in the Pathological Institute in Berlin: 1. That after the long-continued inhalation of chloroform by animals, fatty infiltration of the liver and fatty metamorphosis of the heart, kidneys, and stomach may take place. 2. These changes in the latter organs are due to the action of the drug upon the blood and upon the tissue-cells. 3. Certain individuals show idiosyncrasies for the untoward effects of chloroform. 4. The fatal after-effects manifest themselves by a cardiac paralysis, occasionally accompanied by marked anatomical changes of the myocardium and by a gradual overcharge of the blood by carbon dioxide.

Ungar⁶_{July 20} reports further experiments, which are confirmed by Strassman,²⁰_{Jan. 3} proving rapid fatty degeneration of the internal organs in animals after long-continued chloroform narcosis.

Randolph Winslow, ¹⁰⁴_{June 1} at the Clinical Society of Maryland, and Llewellyn Eliot ⁷⁰⁴_{June 22} report a number of cases in which dangerous symptoms followed the administration of chloroform. Eliot places great reliance upon Nélaton's method of inversion. In a case of secondary syncope occurring after a long operation, under chloroform, which had been preceded by chloral and morphia, Cerne, ²⁰³_{May 1} having found the ordinary means of resuscitation to fail, administered caffen hypodermically with immediately successful effect in restoring circulation and respiration. Schwartz ³⁵_{July 12, 20; Aug 8} calls attention to some of the contra-indications for the administration of chloroform. Among them he places (1) deep shock, as characterized by low temperature; (2) angina pectoris, especially if it be due to sclerosis of the coronary arteries; (3) where the nerves of the bulb are wounded; (4) where the anus is to be invaded by an operation; (5) fatty degeneration of the heart, when known. Pulmonary lesions, especially tuberculosis, require caution. He regards respiratory syncope as more frequent than cardiac, and recommends as treatment long-continued artificial respiration. For cardiac syncope he advises the hypodermic administration of ether and inversion of the patient.

Nine deaths during the administration of chloroform are reported this year:—

1. Male, aged 56 years; operation for strangulated hernia in the Madras General Hospital; had been vomiting and suddenly ceased to breathe. No obstruction found on autopsy. ²¹⁶¹_{Jan.}

2. Female; extraction of teeth; reported by D. Rose, of Waterford. ³⁰_{May 16} The husband sued for \$5000 damages, but the jury disagreed.

3. Male, aged 30 years; amputation of fingers, Tavistock Cottage Hospital; pulse ceased before the operation began. ²_{Mar. 16}

4. Male, aged 36 years, at Middlesex Hospital. Before he died he struggled violently. Chloroform had been administered twice before within a month. He had congenital malformation of the heart. ²_{July 27}

5. Male, aged 58 years; University College Hospital. The operation for removal of an epithelioma of the tongue and floor of the mouth had been finished, and the chloroform was pushed while the stitches were inserted. Autopsy: heart healthy; old pleural adhesions on one side. ²_{July 13, Sept. 14}

6. Female, aged 25 years, at Birmingham, Eng.; extraction of teeth; chloroform administered by her usual medical attendant.²_{Oct.5}

7. Male, aged 6 years; coxalgia; had taken chloroform twice previously.⁶_{Oct.19}

8. Female; amputation of the thumb; Richmond Hospital, Dublin.²_{Oct.19}

9. Chinese boy, aged 16 years; necrosed tibia.²³⁵_{Sept.}

H. I. Neilson,¹⁵⁷_{Oct.} as the result of experiments upon animals and of observation upon man, formulates the following conclusions in relation to the pupils as a guide in the administration of chloroform :—

1. The first effect of chloroform narcosis on the pupils consists in a dilatation, which varies in intensity and duration in different individuals. As the anæsthesia becomes more profound the pupils begin to contract, until they become very small and immovable. If the chloroform be now pushed still further a sudden dilatation occurs, the result of asphyxia, from which the patient seldom revives. 2. As long as the pupil dilates in response to sensory stimuli, such as pinching the skin, the anæsthesia is not yet sufficient to allow the commencement of the operation. 3. As soon as the pupil becomes strongly contracted and immovable the administration of the anæsthetic must be suspended until a commencing dilatation is observed, and the patient must be held at just this point as long as the operation continues. 4. Vomiting causes dilatation similar to that occurring as the patient emerges from the narcotic condition.

As an animating remedy in chloroform narcosis the pouring of ether upon the stomach has been recommended, the cold thus produced giving rise to deep respirations.³⁴_{Apr.9;} ²⁰²_{June 10} M. J. Michon, however, claims.¹⁰_{July 30;} ³_{July 31} that cold applied to the neck is the most effectual.

Maurice Péraire⁹¹_{May 10} remarks that by administering chloroform in small, frequently-repeated doses, it may be given for a long time, using as little as 2 ounces (59 cubic centimetres) of chloroform in a two hours' operation. He administers but a few drops at a time upon a napkin, and with the air excluded. When the chloroform is exhausted he rapidly removes the napkin and quickly applies another moistened with a similar quantity of chloroform, continuing thus during the entire operation, permitting no intermis-

sion in the full anæsthesia. By this method the patient is not suffocated, he is easily habituated without excitement or hyperæsthesia, and rarely vomits. Seven to 8 grammes (108 to 126 minims) are enough to bring the patient into insensibility. Péraire publishes numerous cases, among which were alcoholics, subjects of heart disease, kidney troubles, emphysema, dropsy, and ovarian cysts. The largest amount given was 50 grammes ($13\frac{1}{2}$ fluidrachms) in an operation lasting two hours. He considers it important that strict silence should be maintained during the administration. In his dangerous cases the arrest of respiration occurred before cardiac failure. He quotes four cases, cited by Velpeau, of death from shock without an anæsthetic, to show how death under chloroform is not always due to the drug.

In the Egyptian Hospital of Kasr-el-Aini ²_{Apr.6} chloroform has been administered five thousand times without a single fatal accident, though in about 50 cases artificial respiration, combined with inversion, had to be performed. In India Surgeon-Major Lowrie ⁶_{May 11, Sept. 21} has witnessed between 40,000 and 50,000 administrations without a single death. This safety is explained by the fact that in a high temperature but little chloroform is required for narcotism, and the elimination of the vapor is exceedingly rapid. It would be well, therefore, if possible, to always administer chloroform in a warm and dry air. ³⁸_{2 Q} In the high altitudes of Mexico Chacon ¹⁷⁹_{Oct.} remarks that owing to the lessened atmospheric pressure it takes longer to produce anæsthesia than in Europe.

T. Gaillard Thomas ¹⁹_{Apr. 20} has had such disagreeable results from ether after laparotomies, in the form of prolonged vomiting, etc., that he thinks it a serious question if American surgeons would not do well to abandon its use for that of chloroform in abdominal surgery.

At the command of the Nizam of Hyderabad a commission was last year appointed by the presidency-surgeon. Surgeon-Major Lowrie, to investigate the effects of chloroform. The members of this commission were Surgeons J. Hehir and Chamarette, and J. Kelly. ⁶_{May 11, Sept. 21} Over 200 experiments were made upon 141 dogs.

The following results are of interest: 1. Dogs were anæsthetized on an average in a little over two minutes. 2. Respiration ceased from half a minute to six minutes before the pulse. 3. The heart continued beating from three to thirteen minutes after

the pulse. 4. Artificial respiration was successful in every case when commenced within fifty-two seconds after normal respiration had ceased. 5. Artificial respiration, commenced after the pulse could not be felt, failed in 17 cases and was successful in 29 cases. 6. Artificial respiration was unsuccessful in every case where it was commenced after the heart had ceased acting.

In no case did the heart become dangerously affected by chloroform until after the breathing had ceased. This was so contrary to the accepted theory that it led to some adverse criticism by the London *Lancet*, and this in turn to an offer from the government of Hyderabad of £1000 to the *Lancet* to pay the expenses of a representative of that journal to be present at a repetition of the experiments. Lauder Brunton accepted the appointment and sailed from England some months ago. We may soon expect some valuable results from this investigation.

ETHER.

Geo. F. Shrady,⁵⁹_{Feb. 23} in a clinical lecture upon etherization, sums up as follows: 1. In commencing the administration of ether the gradual method is to be preferred. 2. Its employment allows the lungs to empty themselves of residual air, prevents coughing and struggling, and places the organs in the best possible condition to receive and rapidly utilize the ether-vapor. 3. After the stage of primary anæsthesia is reached, the more pure ether the patient breathes the better. 4. The shorter the time of anæsthesia, and the smaller the amount of ether used, the less likely are the unpleasant sequelæ to occur. 5. The more evenly it is administered, the less shock to the patient. 6. Anæsthesia should be intrusted to experienced administrators only. 7. Many of the fashionable efforts to resuscitate patients are not only useless but harmful. 8. The minimum amount of force should be employed to restrain the muscular movements of the patient. 9. Mixed narcosis is often advisable for prolonged operation. 10. The utility of the galvanic battery in threatened death is yet to be proven. 11. The most trustworthy means of resuscitating desperate cases are artificial respiration, hypodermic stimulation, inhalation of nitrite of amyl, and inversion of the body.

A. Pulido, of Madrid, Spain, corresponding editor, reports that Morales Pérez⁷⁷⁴_{V. 7, p. 334, 378; Nov. 57, 58}⁷⁶⁷ administers ether in a gaseous state. This

is produced by vaporizing the ether in a water-bath heated to 40° C. (104° F.), and leading it by a tube to the inhaler, which also admits atmospheric air. Pérez has used ether by this method in cases with all kinds of complications, and is well pleased with his results.

New ether inhalers have been presented by Burge,¹⁷ and by Flood.⁵⁹ Eddy⁵⁹ suggests a modification of the well-known Allis inhaler.

Parkinson⁹⁹ claims that full etherization can be produced in two minutes with 1 ounce (29.5 cubic centimetres) of ether. In a case of perineal operation lasting seventy-five minutes he used but $3\frac{1}{2}$ ounces (103.7 cubic centimetres). Fritz Fütter³⁰¹ pours 50 cubic centimetres ($1\frac{2}{3}$ ounces) of ether upon a large face-mask, around the edges of which a folded towel is laid to prevent evaporation. As soon as the patient is accustomed to the fumes this is pressed down upon the face. Within two minutes the patient is fully anæsthetized, and, if he has taken alcohol previously, within one minute. Often in the operations of over a half-hour's duration no more ether is required. So little being used, vomiting rarely occurs, and even in kidney troubles serious symptoms do not follow.

Lovett⁹⁹ made some observations as to the time required to produce anæsthesia with ether in the Boston City Hospital. The largest amount of ether used was 4 ounces, the smallest $\frac{1}{2}$ ounce, the average amount 2 ounces. The longest time taken to produce anæsthesia was fifteen minutes; the shortest two minutes, in the case of a child etherized by force. In 22 etherizations without force the average time required was nine and three-tenths minutes; by the forcible method four and four-tenths minutes. The average amount of ether used, when administered without force, was $2\frac{1}{2}$ ounces (75 cubic centimetres), while the forcible method only required $1\frac{1}{2}$ ounces (44.3 cubic centimetres).

The attention of the profession has been called to dementia following the administration of ether by G. H. Savage,² and John Homans.⁹⁹ In both of the latter cases the dementia developed gradually in about one week and lasted about five weeks. Weir⁵⁹ has examined the records of the New York Hospital, and states that in about 12,000 operations performed under ether there were 6 deaths attributed to the anæsthetic, or about 1 in 2000.

The following deaths from ether are reported during the year: MacKellar,⁶_{Apr. 20} colored woman, aged 30, vesico-vaginal fistula, had chloroform administered at the beginning of anæsthesia. Clover's inhaler was used, and 2 ounces of ether had been employed in about half an hour. Post-mortem examination revealed disease of kidneys and heart.

Male, aged 46, amputation of ankle-joint, reported by W. Duncan McKim,¹_{June 1} perished in a few minutes after etherization was commenced. Post-mortem examination revealed complete adhesion of the two surfaces of the pericardium. Patient undoubtedly died from syncope.

BROMIDE OF ETHYL.

Hertz, a dentist in Vienna,⁵⁷_{Apr. 14} reports that he has employed bromide of ethyl in a large number of cases. He uses Esmarch's or Skinner's inhaler, into which he pours $\frac{1}{2}$ ounce (15 cubic centimetres) of the drug at first, adding more when necessary. Anæsthesia comes on in from one to two minutes, and he states that he has had no accidents with this anæsthetic used in such a manner. We regard this quantity as excessive and dangerous. In a single measured dose of 30 minims (1.0 cubic centimetre) poured upon a handkerchief or towel, and not repeated, it is well adapted for short, painful operations.

Lewin,²²_{May 1} claims that bromide of ethyl does not act as a cardiac depressant, and regards this as an advantage over chloroform, remarking, however, that during deep narcotism with this agent the animal temperature falls 2° F. (1.10° C.).

Eschricht, of Cöslin,⁶⁹_{Aug. 1} ²⁶_{Nov.} and Diehl, of Pittsburgh,¹⁶¹_{Apr.} speak highly of bromide of ethyl, the use of which they have revived. Eschricht says of it: "There is no danger. Anæsthesia is very rapidly induced, and there are none of the unpleasant after-effects of chloroform. He considers it important, however, to use Merck's preparation only, and to keep it in a dark vial to prevent the effects of light.

Diehl also speaks of its rapid action and of the early disappearance of its effects, the patient regaining full consciousness in a few minutes, and that there is very often utter insensibility to pain, with full control of the mental faculties. Further, he notes the absence of all irritating properties in the vapor and dwells on the harmlessness of the *pure* drug.

A danger in the employment of bromide of ethyl has been called attention to by Hirsch.¹¹⁶_{Dec. '88} Ethyl bromide and ethylene bromide have been frequently associated, and have even been dispensed one for the other. Thus, in one case where narcosis failed he found the article used to be ethylene bromide. The ethylene bromide feels oily and produces nausea when inhaled. He regards ethyl bromide as of great value in short operations where the surgeon is without assistants.

In connection with this may be cited a case of death from ethylene bromide.¹¹⁶_{Aug. 1} The patient, a healthy male, aged 31, was operated on for ingrown toe-nail. Ethylene bromide was administered in mistake for ethyl bromide. Forty grammes ($1\frac{1}{3}$ fluidounces) failed to produce narcosis, the patient became much excited, the conjunctivæ were injected, and great laryngeal irritation was caused, accompanied by pain in the chest. The anæsthetizer also felt an irritation of his eyes. The operation was finished under chloroform without special incident. On awaking, the patient complained of pains under the heart, vomited several times that day and on the day and night following, when death ensued with full consciousness and with symptoms of heart failure. The autopsy revealed highly congested lungs and congested mucous membranes of trachea, bronchi, and broncheoli, while the heart was flabby. Chemical examination of the remaining supposed ethyl bromide showed it to be ethylene bromide.

NITROUS OXIDE.

R. Gersung,⁸_{v. 2, p. 651} reports experiments made, together with Hillischer, on the use of a mixture of 88 per cent. of nitrous oxide and 12 per cent. of oxygen for surgical anæsthesia. The experiments were made at the Rudolfinerhaus in Unterdöbling, Hillischer administering the mixed gases in nearly all the 8 cases. The duration of the narcosis was from eight and a half to thirty-three minutes. The time required to produce narcosis varied from one-half minute to four and a half minutes; in 1 of the cases it required ten minutes; in 3 of the cases the narcosis was quite satisfactory; in 2 others alarming symptoms were noticed, but more oxygen was added and the narcosis continued, and no unpleasant after-effects were observed. Gersung states that his favorable expectations were not realized. He thinks this method

for short dental operations perhaps the best, but for surgical anæsthesia it cannot take the place of chloroform.

In connection with Gersung's observations, Hillischer⁸_{Aug. 8} claims that, in his opinion, it is possible to avoid alarming symptoms by more experience with the method of administration. The difficult and complicated manner of its administration he regards, however, as an objection. He further states that he has made 10,000 administrations of these mixed gases for narcosis of short duration, but that he himself would have to acquire greater experience before using them safely for the longer anæsthesia necessary for surgical purposes.

A large number of experiments with the combination of nitrous oxide and oxygen were also made by Fred. Hewitt.⁶_{Apr. 27} After a number of unsuccessful efforts with it, he found that a mixture containing 12.77 per cent. of oxygen answered admirably in 11 consecutive cases. There was no excitement, the respiration was regularly and quietly performed, the color of the cheeks and lips remained unimpaired or was even improved, no stertor was noticeable, and the available period of anæsthesia was longer than when pure nitrous oxide was used. Further experiments convinced him that he would have to change the proportions of the mixture of the two gases to suit each patient. To this end he devised a gasometer, by the aid of which he was enabled to measure and regulate the proportions of the mixture during the administration. With this apparatus he anæsthetized 78 patients, the mixed gases being under slight pressure, which he considers very important. The average period of inhalation before he removed the face-piece was one hundred and twenty-six seconds; the average available anæsthesia was forty-four seconds; the average quantity of the mixture required was $8\frac{3}{4}$ gallons (33 litres). There was not the slightest cyanosis in any instance. The color of the face and lips was often brighter when the face-piece was removed than before it was applied. The pulse was strong and regular and about 85 to the minute; in no case was there any clonic movement, but recovery was not quite as rapid as when pure nitrous oxide had been used.

A death from nitrous oxide is reported.⁶_{Oct. 19} It occurred in a dentist's chair in Edinburgh. The patient was 71 years of age, was tightly laced, had a full stomach, was known to have ad-

vanced fatty degeneration of the heart, and had great fear of the operation.

METHYL CHLORIDE.

Trélat¹⁰_{June 25}; ¹⁴_{July 17} quotes the researches made by Villejean and Regnaud, which showed that the pretended methyl chloride which has been praised by Spencer Wells and Le Fort is nothing but a mixture of 4 parts of chloroform and 1 part of methylic alcohol. It has the advantage over ordinary chloroform that it is unalterable in air and light.

Polaillon¹⁰_{Apr. 23} states that he has used for six years the bichloride of methyl obtained from England, and he does not find its effects identical with the mixture of Regnaud. He considers it superior to chloroform, though the anæsthesia is longer in being induced. Excitement occurs less often and in a less degree; vomiting during the operation is exceptional, but more frequent afterward; malaise is not as frequent as after chloroform. He thinks it less dangerous than the ordinary chloroform.

Fort,¹⁰_{June 25}; ²²_{July 24} who has used frequently both methylene chloride and chloroform, finds that methylene chloride acts more slowly than chloroform, but that the patient is less agitated, and that vomiting during and after the operation is much less frequent. Laborde¹⁰_{June 25} also states that methyl chloride has given him excellent results, and that it is less dangerous than chloroform when used on dogs.

Ernest Feibes,⁴_{p. 102}; ²_{Oct. 19} calls attention to the extensive use in the Paris hospitals of methylene chloride as a local anæsthetic. The readiness with which the gas liquefies makes it convenient for use. It may be applied directly as a spray, or better by Bailly's method, described in the ANNUAL for 1889.

Richardson,³⁸_{1 Q} in commenting upon the use of methylene chloride as a local anæsthetic, states that the effect is due solely to the fact that the part is frozen by the rapid conversion of the liquid methyl chloride into gaseous form, and that it has no inherent local anæsthetic effects.

Bardet,⁸⁰_{Feb. 15} proposes painting the surface of the part with glycerin before spraying it with methyl chloride; this, he claims, does away entirely with the danger of sloughing. Vincent, of Paris,⁷¹_{Feb. 1} describes a pocket apparatus devised by him for regulating the stream of the methyl chloride.

COCAINE.

The activity of synthetical chemistry has lately been markedly demonstrated in connection with cocaine, which has been synthetically prepared from benzoyl-ecgonine by introducing into it the group methyl. Recently Einhorn⁶_{Apr.4} has announced and described three further substitution compounds in which the place of methyl is taken by other groups. One of these is the lower homologue of true cocaine, while the others are metameni or higher homologues. Two of these could not be obtained in a crystalline form, but only in the form of oil. The third, however, and the salts of all three, are crystallizable. So far it has not been stated whether any of these new "cocaines" possess any special therapeutic properties. The importance of these discoveries can scarcely be overestimated if they can be worked with sufficient precision to provide for an increased supply of cocaine of certain composition and good quality.

Reclus and Isch Wall⁹¹_{Feb.10} advocate the more general use of cocaine in surgery. They have used it over 700 times, and have noted but few and slight ill effects from its use. In but 4 cases were the symptoms serious, such as pallor, cold sweats, rapid pulse, dyspnœa, etc. They question if these were not due to the effects of fear on the part of the patient. Before introducing a stomach-tube they paint the posterior buccal and pharyngeal mucous membrane with a 10-per-cent. solution, and thus abolish the sensitiveness of the parts. In anal fissure they insert a tampon of gauze soaked in the solution. The annoyance of the fissure disappears, and it is often thus cured. The anal itching which accompanies hæmorrhoids is controlled in the same manner. Vaginismus is relieved by its use. In cases of hydrocele, serous cysts of the neck, spermatic cysts, and epithelioma of the lips, this local anæsthetic answers every purpose in their hands. They even claim that lithotomy is made possible by its use without any other anæsthetic. Six injections made equidistant around the anus render the forcible dilatation of that orifice painless.

When an operation involves the skin the injection should be made into the derma itself, and not into the subcutaneous cellular tissues; if the skin is inflamed the cocaine is equally efficacious in obtunding the pain.

The senior editor of this department is in the habit, when

using cocaine in an extremity, of placing the Esmarch tourniquet around the limb above the seat of the injections, and, when the operation has been finished, of loosening the tourniquet and immediately tightening it, so that but a small portion of the cocaine contained in the isolated part may enter the general circulation. This is repeated at intervals of a few minutes until the cocaine has probably all entered the circulation in this way, and has been disposed of. He finds that in this manner quite large amounts of cocaine may be used without producing any ill effects. Before using this method he had often found symptoms of poisoning occur when loosening the tourniquet after a fifteen-minute operation, while during the operation there had been no symptoms whatever. Long¹⁴⁹_{Sept.} uses it in hæmorrhoids, injecting 10 to 20 minims of a 2-per-cent. solution. He also employs it when operating for ingrown nails, in phimosis, and other surgical procedures. When operating on limbs he finds anæsthesia by this method more perfect if he injected immediately before the tourniquet is tightened, than if injected afterward, as the circulation distributes it throughout the limb.

Wyeth¹⁰¹_{Oct.} speaks of its undoubted danger, and states that its dose is still very uncertain, differing widely in individuals and in the same individual at different times. He further states that cocaine in moderate doses is a cardiac stimulant; in larger quantities it arrests the heart in diastole. In small doses it increases the number of respirations, and in large doses it rapidly arrests the action of the muscles of respiration.

In several hundred applications he has seen no alarming symptoms, but regards it as never applicable to children under 10 or 12 years of age, differing in this respect from Hunter McGuire,⁵⁹_{Oct.5} who thinks children bear cocaine better than adults. Wyeth uses a 4-per-cent. solution of the hydrochlorate with 2 or 3 grains (0.2 gramme) of boracic acid to the ounce of the solution. Pilcher uses a stronger antiseptic solution composed of equal parts of a saturated solution of salicylic acid and distilled water, in which the cocaine is dissolved. Wyeth finds that when the solution of cocaine is thrown in the line of incision it is apt to prevent primary union; he, therefore, injects it deeply into the tissues, using a very fine hypodermic needle, passing it, as in amputation of a finger at the distal joint, nearly through the

finger, injecting a drop of the solution every $\frac{1}{4}$ of an inch (6 millimetres). The injection is then repeated on the other side of the bone; the elastic ligature, which has laid loosely around the base of the finger, is then quickly tightened. If the anæsthesia be not sufficient it may be repeated. Wyeth usually finds that 15 minims (1 cubic centimetre) are enough, though 30 may be employed without risk.

In operating upon the trunk, say, for a fatty tumor, he carries the needle-point in the proposed line of incision into the deeper layers of the skin (not into the subcutaneous fat) and forces out from $\frac{1}{2}$ to 1 minim (0.03 to 0.06 cubic centimetre), advances the needle $\frac{1}{4}$ of an inch (6 millimetres), and repeats the injection, and so on, as far as the needle will reach from the original puncture; he then re-inserts the needle and repeats the method until the line of anæsthesia is established. Insensibility occurs immediately, the incision is made at once, and the dissection carried laterally until pain is experienced. A $\frac{1}{2}$ minim or more is then injected where the pain is experienced, and the work with the knife or scissors is then proceeded with directly after the injection. By this method fatty tumors 3 to 4 inches ($7\frac{1}{2}$ to 10 centimetres) in diameter may be removed; also cystic tumors 2 inches or less in area, all forms of neoplasms, angiomas, moles, cicatrices, etc., not covering a larger area than 4 square inches. Exploration of abdominal wounds, down to but not through the peritoneum, may be conducted in the same manner. Tumors of the lips, cheeks, and tongue are rendered perfectly insensible when from 5 to 20 minims of a 4-per-cent. solution is injected into their base.

For internal urethrotomy, in sounding and searching the bladder by cystoscopy, also in painful cystitis, it is often of immediate and great value.

Ignaz Link⁸⁴_{Dec. 22, '88} uses a 5-per-cent. solution of cocaine hydrochlorate. In an extensive experience he has had no bad effect from it upon the patient, nor does it interfere with the aseptic condition of the wound. He recommends it highly in litholapaxy, but considers it useless in inflammatory tissues.

Freudenberg, of Berlin,⁴_{July 8} in a valuable article on cocaine in litholapaxy, quotes 45 operations by other surgeons, and relates the cases of 13 patients of his own, on 12 of whom he performed 20 operations successfully by the aid of cocaine. In 1 case of his own

and in 3 others the anæsthesia was not successful, and chloroform had to be used. All of his cases were in old, broken-down subjects with prostatic hypertrophies, cardiac and vascular lesions, and otherwise unfitted for chloroform. Patients on whom chloroform and cocaine had been used at different times preferred the latter.

From 1 to 4 grammes (15 to 61 grains) cocaine, and in 1 case 5 grammes (77 grains) were used; this latter case was the only one in which symptoms of cocaine intoxication were noticeable. With the smaller doses a diminution of the pain was produced, but with the higher doses alone could full anæsthesia be accomplished. The most difficult part is to relieve the pain while the evacuator is used, as the muscular coat is unaffected, the mucous membrane alone being anæsthetized. His method in using cocaine for litholapaxy consists in first emptying the bladder, washing it out, and then injecting 40 cubic centimetres ($1\frac{1}{2}$ fluid-ounces) of a 6- to 8- per-cent. solution of cocaine; five minutes afterward the bladder is injected with 120 cubic centimetres (4 fluidounces) of a solution of boracic acid, and the operation is then proceeded with. The urethra, in its whole length, must also be cocainized. To move the patient about to bring the cocaine solution in contact with all parts of the mucous surface of the bladder is by him found unnecessary. The lithotrite is introduced within six to eight minutes after the bladder and urethra have been cocainized. Freudenberg states further that in but 2 cases so treated had anæsthesia failed, but even in these it might have succeeded had larger doses of the drug been employed; the more concentrated solutions acted the best in his cases.

He considers that this method is applicable and useful only in cases where the stones are small and the whole operation can be finished in from fifteen to twenty-five minutes. He concludes that cocaine must be used with caution, as it is undoubtedly dangerous; in case of alarming symptoms the bladder should be rapidly emptied and immediately washed out.

Regarding the bad effects from cocaine applied for surgical anæsthesia, Judkins¹⁵¹_{Sept. 19} reports 2 cases in which dangerous symptoms were produced by this agent. Buscarlet¹⁹⁷_{Jan. 20} also cites a case where, in the operation for the radical cure of hydrocele, cocaine was injected before the iodine solution, and which was followed by

pallor, cold extremities, and other symptoms of cocaine poisoning. Several other cases are described in Section E, this volume.

CARBONIC ACID AS A LOCAL ANÆSTHETIC.

J. Voituriez ²²⁰_{Jan.15} calls attention to the fact that insensibility to pain is obtained by projecting upon the part a stream of water charged highly with carbonic acid gas. He uses the contents of two or three siphons of Seltzer water; the partial anæsthesia so obtained would last from four to five minutes. He reports 3 operations performed under this anæsthetic. For trifling operations, where other methods are inconvenient, he thinks that this might be readily employed.

STROPHANTHUS.

Steinach ⁸_{Nov.21, '83}; ²_{June 22} has shown that a substance found in strophanthus seeds, besides the strophanthin, possesses local anæsthetic properties when placed upon the conjunctiva, anæsthesia being complete in twenty-five minutes and lasting from two to twelve hours. It gives rise to no great irritation, but causes a slight feeling of burning and transient hyperæmia.

OUABAIN.

Gley, of Paris, ³_{Nov.13} communicated to the Society of Biology his researches on the local anæsthetic properties of ouabaine and strophanthin, which were isolated by Arnaud. If, of either of the two, 4 drops of a $\frac{1}{1000}$ solution are instilled into the eye of a rabbit, it produces complete anæsthesia of the cornea without causing other phenomena except a small degree of myosis, and the anæsthesia lasts for several hours.

SURGICAL DRESSINGS AND ANTISEPTICS.

By JOHN H. PACKARD, A.M., M.D.,

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WHILE it is evident that what is known under the general name of the antiseptic theory dominates surgical practice all over the world, it is yet clearer that it has not itself reached its ultimate stage of development. The necessity of thorough cleanliness—sterilization—of hands, instruments, field of operation, and dressings is fully recognized. But neither the means nor the methods of attaining this are as yet satisfactory. An active search is continually going on for new materials of greater efficiency or for better modes of employing those already known. The antiseptis of to-day is not the antiseptis of five years ago, and very possibly it may not be that of even twelve months hence.

The reaction against antiseptic surgery noted last year seems to have, in great measure, subsided. Only one very positive expression of such views has appeared, and that emanated from the President of the British Gynæcological Society. It is rather singular that abdominal surgery, which owes its great recent advances to antisepticism, should be the field in which this theory now meets with the strongest opposition.

A large number of articles on the general subject of antiseptics have been published within the past year, many of them, however, being merely repetitions of the opinions, directions, and formulæ already familiar. Several essays are devoted to the explanation of methods by which the antiseptic system may be put in practice by country surgeons. Among these there are some meriting special mention: one by Wheeler,⁷⁶⁰ one by Burns,⁹⁹ and another by Schuler.²¹⁴

A very interesting discussion of the application of the antiseptic theory in the surgery of childhood is given by Charon.⁸⁸² He instances particularly the operation for harelip, and those of cystotomy and tracheotomy, as giving better results when performed under such conditions.

An article by Primrose³⁹_{Jan. 16} urges the importance of the study by surgeons of the experiments and methods by which the practice of antiseptics is supported and carried out, and dwells upon the value of accuracy and thoroughness of detail, as well as of intelligent comprehension of the principles involved, as essential to insuring the best results.

Anagnostakis²²⁰_{July 19} makes the somewhat curious claim that antiseptic surgery was known to the ancients and practiced by them. In support of this idea, he cites passages from Hippocrates, Galen, and others, as to cleanliness of instruments and the use of resins and other medicaments. It does not seem, however, that any one can seriously maintain on these grounds the existence in those days of anything approaching the modern theory and practice of antiseptic surgery.

An interesting article on antiseptic surgery, based upon experiments, has been published by Tucker and Burrell.⁹⁹_{Oct. 3} Their conclusions are that, while *absolute* asepticism is very difficult to attain, *practical* asepticism may be had by attention to details; that clinical experience attests the value of the principles of antiseptics; that thorough cleanliness is a preventive of sepsis; that "germicides" well applied, in sufficient quantities, will inhibit the development of septic germs. The discussion on this paper⁹⁹_{June 20} may be read with interest, as showing some of the phases of opinion prevailing among practical surgeons.

With regard to the sterilization of instruments, Edington²_{May 11} says it is clear that if carbolic acid is depended upon, an immersion of at least two days in a 1 to 20 solution is required, and the tray itself must be sterilized in the same way. Freeman and Oliver,⁵³_{Mar. 2} from a somewhat extended study of the subject, have arrived at the same result as other observers,—that the best mode of sterilization is to expose the instruments to steam at 212° F. (100° C.) for five minutes, or to boil them for the same length of time in a nearly closed vessel. A good deal of ingenuity has been expended on the Continent of Europe in devising special forms of apparatus for this purpose. In an article by Guernonprez²²⁰_{Oct. 4 to 13} there are represented fourteen different patterns. Another is described by Ostwalt,¹_{Dec. 31, '88} another by Straub,³³⁶_{Aug. 17} and still another by Skutsch.⁷¹_{June 1} The principle in all these is very much the same, but the details of construction vary. In a large hospital, where a good

many instruments have to be often sterilized, an apparatus specially designed for this purpose is highly desirable; but in private practice the surgeon can generally manage with such vessels as are to be found in every house.

A very good pattern for an antiseptic pocket-case is described and figured by Dawbarn.⁵⁹_{Oct.9} This is probably the weakest point of most surgeons in the carrying out of antiseptics in their practice; yet the old style of the article has been often shown to be, in the highest degree, objectionable.

While many surgeons have totally abandoned the use of sponges, it is not easy to find an entirely satisfactory substitute for them, and hence plans for rendering them aseptic are not without value. A writer, signing himself "M. M."⁶_{Jan.26} quotes a statement that in Copenhagen sponges are used for the filtration of milk, and are cleansed by passing them repeatedly through hot steam and pressing them between rubber rollers. Benckiser⁹_{Aug.10} claims that an exposure for twenty minutes to a temperature of 284° F. (140° C.) is efficient for the purpose. Perrens²⁴_{Oct.12} gives directions for the preparation of new sponges as follows: The sponges are first freed of sand, dust, and gritty particles, and are then washed in water; they are next soaked for six hours in very dilute hydrochloric acid; then for a like time in a weak solution of permanganate of potassium; then for two hours in a weak solution of bisulphate of soda, with a minute quantity of hydrochloric acid; then they are washed again, and, finally, put into a mixture of water and alcohol, to which is added a little thymol or carbolic acid; in this they are to be kept for use.

From experimental studies with various antiseptics, Edington²_{May.11} asserts that the prophylaxis and the cure of sepsis in surgery are two distinct things; and that certain agents capable of being used efficiently as prophylactics against it are absolutely useless for its cure when it has once begun in wounds; that is, that the terms "germicide" and "antiseptic" are not synonymous. Further, he draws a distinction between the minimum and maximum actions of any special antiseptic; thus, in case of corrosive sublimate, the former is 1 to 10,000, the latter 1 to 4800, while for hydronaphthol the former is 1 to 7200, the latter between 1 to 2500 and 1 to 3000. He concludes that for practical purposes in surgery hydronaphthol is much more powerful than sublimate, while it is

non-poisonous. It should be used in alcoholic solution, with or without glycerin, and diluted sufficiently with water. Edington thinks that the balance of experienced opinion tends to show that the confidence of surgeons in sublimate is misplaced.

Kingzett²⁶_{Aug. 6} gives the results of experiments on the comparative antiseptic values of certain chemical substances. His conclusions are that the chlorides, nitrates, and sulphates of the alkalis have but slight power, and that those of the alkaline earths are not much better. The compounds of manganese, zinc, tin, iron, lead, and aluminium are all of value, the chlorides being, as a rule, preferable.

The relative germicidal value of the so-called antiseptics has been studied by Weeks.⁵⁹_{Aug. 3} His experiments were made with the staphylococcus pyogenes aureus and the typhoid bacillus, and he gives his results in a list, the articles being named in the order of their value: Bichloride of mercury, chloride of lime (fresh), chlorinated soda (fresh), chlorine-water (saturated), nitrate of silver, salicylic acid, creasote from birch-wood (Merck), alcohol (absolute), carbolic acid, "sanitas" oil (No. 1), "sanitas" (crude), potassium permanganate, bisulphate of mercury, "sanitas" disinfecting fluid, creolin, trichlor. phenol (in ether), hydrogen dioxide, aseptol, listerine, oil of eucalyptus globulus, iodoform and ether, balsam of Peru, oil of thyme, chloride of iron, tincture of chloride of iron, solution of chloride of iron, iodide of silver, naphthalin in ether, oxynaphthoic acid, ichthyol, oil of cade, biniodide of mercury, oxycyanide of mercury, yellow oxide of mercury, red oxide of mercury, bromide of mercury, resorcin, beta-naphthol, potassium hydrate, thallin, terebene, iodoform.

An interesting discussion³_{Aug. 3} is reported as having taken place at the Congrès International de Thérapeutique et de Matière Médicale on the various parasitocides and their efficiency against different micro-organisms, the influence of temperature being also dwelt upon. Sublimate solutions would seem to have been regarded as entitled to the first rank among the very large number of substances which have been brought into notice as antiseptics. Semmola called attention to the value of sulphur, first proposed (in the form of hyposulphites) by Polli, of Milan, in 1860, long before the present theories as to antiseptics had been enunciated.

McCaskey⁵⁹_{July 13} discusses the inhibitory action of antiseptics,

suggesting that the desired object may be obtained by using these agents with the view not of destroying micro-organisms, but of making them functionally inactive. For the latter purpose solutions one-fifteenth the strength of those which are germicidal will suffice, and will be harmless to the tissues.

Our corresponding editor, A. Ulrik, of Copenhagen, notes the following statements by Ehlers.³⁷³
July Impregnated materials for dressings, which are dried and kept dry, cannot merely by reason of the impregnation be regarded as sterile. Mere impregnation cannot be depended upon, but the materials so prepared should be previously sterilized by boiling or by steaming. If we want to use dry dressings we must subject them, after drying, to dry sterilization. Silk, which is easily sterilized by boiling, should not be kept in the same receptacle with catgut, which does not bear boiling well and is not easily sterilized.

Footes⁵_{Sept.} discusses the germicidal value of creolin, hydronaphthol, and sodium fluosilicate, as compared with one another and with some of the older articles. His conclusions from experiment are that the substances rank as follows: Bichloride of mercury, 1 to 20,000; carbolic acid, 1 per cent.; thymol, 1 to 240; creolin, 1 per cent.; hydronaphthol, 1 to 2300. He ascribes very little power to resorcin (1 per cent.); creolin, 1 to 2000; and sodium fluosilicate, 1 to 240.

Geppert⁴_{Sept. 9, 16} details his method of experimentation. He has found that anthrax spores may remain infectious after being for hours suspended in a 1 to 1000 solution of sublimate, provided the latter has become precipitated. A suspension of spores mixed with sublimate and injected into guinea-pigs rarely infects them. Blood mixed with spores and sublimate is highly infectious. Anthrax spores which have lain some time in sublimate solution do not grow in culture media, in which the normal spores would thrive; yet they retain their infectious property. The same observation has been made as to bacilli which have lain in sublimate or in carbolic solutions. When a disinfecting solution is mixed with a suspension of bacteria, and cultures are made with like quantities, the number of colonies is less in proportion to the length of the exposure to disinfection. The results of experiments on animals do not always correspond with those of experiments on culture media.

The frequent absence of sublimate in dressing-materials supposed to contain it has been commented upon, ²⁴_{Oct.13} and is explained by the presence of calcareous salts in the fibres of the stuffs employed. These ought to be first gotten rid of by washing with distilled water and a small quantity of hydrochloric acid; after this, several washings with distilled water should be used, and the cotton, thoroughly dried, may be carded, and an alcoholic or ethereal solution of bichloride sprayed upon it as it leaves the carding machine.

Salomon ²¹²_{Sept.} proposes to make more stable solutions of corrosive sublimate by adding chloride of sodium and some hydrochloric or tartaric acid, and, to prevent toxic effects, by the further addition of emetic substances like sulphate of cadmium or sulphate of copper.

A new antiseptic compound has been proposed by Sir Joseph Lister ⁶_{Nov.9} in the double cyanide of mercury and zinc incorporated with powdered starch. The advantages claimed for it are stability, blandness, and efficiency.

Wade ¹¹⁰⁶₈₈ advocates the use of a new antiseptic,—the sulphite of aluminium; he claims that it is efficient, non-poisonous, unirritating, unaltered by albumen, cheap, and answers all purposes.

The disinfecting powers of the kresols, three forms of distillates from carbolic acid, analogous to phenol, are said by Fränkel ⁵⁸_{July} to be very great. The author discusses the chemistry of the subject at much length, and cites his experiments in tabular form.

The soziodol preparations of potash, soda, zinc, and mercury, have been reported upon by Thomán. ⁸_{Sept.19} They are all said to be odorless and to have antiseptic powers; the soda compound is, however, of most general application on account of its much more ready solubility in water.

Bernardy ⁸²_{Feb.9} advocates the use of biniodide of mercury as an antiseptic in preference to corrosive sublimate. In order to increase the solubility of the salt, iodide of potassium is added. For irrigation a solution of from 1 to 2000 to 1 to 4000 may be used. Bernardy speaks of biniodide wool, which he employs instead of the sublimate cotton so well known as a covering for surgically wounded parts.

Girard ²¹⁴_{July 1} also speaks very highly of the biniodide of mercury in combination with the iodide of either sodium or potassium.

Hare¹¹²_{Sept.} asserts, in opposition to Woodhead's statement, that this substance throws down, with blood, defibrinated blood, or serum, a copious insoluble precipitate of albuminate of mercury, which is, indeed, redissolved if an excess of albumen is present; but, as this latter fact cannot be determined in any given case, the biniodide is too uncertain to be depended upon.

According to Hart,²_{May} biniodide of mercury with iodide of potassium has been used with success for a number of years by Trélat at La Charité. The solution employed is said to be in the strength of 0.1 gramme (about 1.5 grains) of the biniodide to the quart of water, or about 1 to 15,000; and this is thought to be, at least, as efficacious as a 1 to 1000 solution of the bichloride.

Sodium silico-fluoride, known also as "salufer," is strongly recommended as an antiseptic by Croskey,⁷⁹⁹_{July}. He says that it is efficient, non-irritating, and odorless. A solution of 1 grain to the ounce of water is strong enough for ordinary purposes; it may be used safely even in washing out closed cavities. This article is a very efficient deodorizer for the hands. It may be used in solution, 10 grains (0.65 gramme) to the pint of hot water, to saturate gauze or absorbent wool for the purpose of making an antiseptic poultice.

Poirson¹⁶⁸_{June 1} advocates the employment of beta-naphthol in surgical dressings, either in the form of collodion or of liquid preparations made with camphor and glycerin or spirits of wine. An article probably somewhat similar, under the name of campho-phéniqué, has been highly recommended by Broddus¹⁷⁶_{Nov} and Bernays¹⁸²_{Nov}.

Terebene is strongly advocated by Bogomoloff⁹⁶_{July} as a cheap and effective antiseptic, disinfectant, and deodorizer. In its impure state it is irritating. On distillation it yields a resin, used for the disinfection of cess-pools, etc., and a fluid; the latter, further distilled, gives a gas and a dark-brown resin, valuable in preparing soaps and terebene-paper; with water it makes an excellent lotion for surgical or obstetrical purposes.

The styptic and antiseptic properties of turpentine are highly praised by Banks,¹⁸⁷_{July}

Copaiba is again recommended as a material for dressings by Beach,⁹⁹_{Aug. 3} and the same author¹⁰⁰_{Aug. 1} speaks very strongly of the merits of styrone,—a compound of liquid storax and balsam of Peru,—which is said to be efficient, non-irritating, and agreeable in odor.

Beach advocates its use both internally and externally, citing cases and experiments in proof of the value claimed for it.

Nobili⁵⁰⁵_{Nos. 76, 77, 78} recommends guaiacol as a sovereign remedy in tuberculosis; he says it destroys the bacilli, strengthens the resisting power of the tissues, and is free from irritating influence on the digestive organs.

Cadéac²¹¹_{June 23} claims for the essences valuable antiseptic properties. Some of them—the essence of canella, for instance—are, in his opinion, as destructive to microbes as sublimate or phenic acid. Ollier, Diday, and others have had such experiences as incline them to indorse this view.

Buchner and Segall³⁴_{May 14} have experimented on the antiseptic action of certain vapors, and assign the highest degree of efficiency to that of chloroform, that of formaldehyd coming next, and then that of creolin. Carbolic-acid vapor is even less active.

Concerning iodoform, Tilanus³⁴_{Aug. 6, 13} from recent experiments, concludes that it is an antimycotic in the sense that it hinders the increase of certain special sorts of micro-organism, even when it is only present in very small quantity; but it has not yet been shown to destroy them. He employs it as a dusting-powder, often with the addition of equal parts of boric acid and zinc oxide.

Van Arsdale⁵_{May} thinks that iodoform may be regarded as valuable on account of its power of destroying ptomaines in operations about the mouth, vagina, and rectum, and as an application to putrid surfaces.

Bowlby⁶_{Feb. 9} records 3 cases of poisoning by iodoform; in 1 the patient died, but it does not seem clear that this result was traceable to the drug. Keetley⁶_{Jan. 26} mentions a case in which the occurrence of delirium was ascribed to the use of iodoform in surgical dressings.

The question of the mode of action of iodoform, whether by the liberation of iodine fumes or by itself becoming a vapor, has been taken up, but not settled, by two writers, signing themselves H. R. and J. R.⁴⁶_{Oct.} It has also been discussed by Lefour and others.¹⁸⁸_{Mar. 30}

To make iodoform gauze, Weir¹³⁸_{Apr.} directs the addition of 3 drachms (11.66 grammes) powdered iodoform to 6 fluidounces (186.60 grammes) of suds made with castile soap and a solution of sublimate (1 to 5000); if the emulsion thus made is poured over and rubbed into 2½ yards (2.29 metres) of gauze, the latter is

charged to the extent of 10 per cent. To make 25-per-cent. gauze it is necessary to use 7 drachms (27.20 grammes) of the iodoform.

An adherent gauze may be made by imbuing 5 yards (4.58 metres) with a mixture containing iodoform, 3½ ounces (108.90 grammes); resin, 1½ ounces (46.65 grammes); alcohol, 4 fluidounces (124.40 grammes); glycerin, 6 fluidrachms (23.33 grammes).

Widely different opinions have been quoted_{June 9}, as to the value of creolin. Hünemann says it has no right to be ranked among antiseptics. Behring thinks it three or four times as weak as carbolic acid, but not so poisonous. Baumgarten thinks, on the contrary, that it is a strong animal poison, and antiseptic only in doses which would be fatal. On the other hand, it is highly recommended by Eisenberg in 2- to 5-per-cent. solution, and Seidel and Hörnicke think gauze impregnated with a 10-per-cent. solution an admirable substitute for bichloride gauze. Kortüm and Bunsen have used it with great success in obstetric practice. Rausche thinks it a good deodorizer, and an excellent application for burns and superficial wounds. Amon, Prutscher, and Purjesz have employed it with satisfaction in ophthalmic and aural surgery, while Späth, Pieskoff, and others have found it useful in affections of the throat, nose, and larynx.

Roux²⁶_{Aug.} bears testimony to the value of creolin as a satisfactory substitute for phenol, corrosive sublimate, and iodoform in all cases where a powerful deodorizer or a less dangerous and yet reliable antiseptic is desired.

Our corresponding editor, Diakonoff, quotes the views of Lenevitch⁵⁸⁶_{Nov 6,8} as to creolin. This substance is said to possess very great antivegetative power, but only slight value as an antiseptic; that is to say, while it renders the development of pyogenic microbes almost impossible in a medium in which it is present, even in very small quantity, it does not destroy them during a certain time (two hours) in the strength of 5 per cent. On the contrary, carbolic acid does not make a medium unsuitable for the development of pyogenic microbes unless it is very strong, while its antiseptic power, even when diluted (2 per cent.), is considerable. Hence, creolin is especially useful in the washing out of cavities, since the smallest quantity of it, retained, will render the tissues unfavorable to the existence of microbes.

It may be noted that Baumgarten⁵⁰_{Jan. 18} reports experiments

made with creolin, from which it appears that this substance is poisonous to guinea-pigs and mice, especially when injected into the peritoneum. He does not agree with Fröhner that the deaths are due to suffocation by globules of creolin lodged in the capillaries of the lungs. He does not think the question of the practical value of creolin as a local antiseptic and disinfectant is prejudiced by the result of his researches.

Boric acid and oil of cassia are highly spoken of by Prince²²⁴_{Mar. 30} as a wound-dressing, especially in cases when sloughing has occurred or is unavoidable.

Eller⁹_{Apr. 13} recommends a mixture of cocaine hydrochlorate, 3 parts in 60 of water, with 6 parts of boric acid in 8 of glycerin, with 2 parts of carbolic acid added, to soak cotton with for dressing burns.

Salol (salicylate of phenol) is advocated by Corner²_{May 4} as a dressing.

Peat-moss, or "vegetable felt," is stated to be a valuable material for dressings by Iakimovitch.²⁵_{June} Antiseptic properties have been ascribed to it by Leshtchinsky, but the claim is denied by Uspensky and others who have investigated the subject.

Dannheisser¹³_{July} mentions the good results of the employment in the Strasbourg clinic for the last five years of a sugar-dressing for wounds. Sometimes in tubercular cases iodoform was added in the proportion of 1 part to 10. The sugar is dusted over the part and applied in a sack of sterilized muslin from which all oily matter has been washed out. It is not claimed that it is antiseptic, but only that it acts as a protection to a wound which has been already rendered aseptic.

Lubbert and Schneider¹³⁸_{Apr.} advocate the substitution of chloride of sodium for tartaric acid as an addition to sublimate solution for dressings, with the view of making the gauze smoother. Alcohol makes the mixture dry more rapidly, but if too much is added the salt will be precipitated. They give as a good formula: Dissolve 100 parts of chloride of sodium in 600 of distilled water; filter, and add 3 parts corrosive sublimate; when this is completely dissolved add 200 parts alcohol and 100 parts glycerin.

Sublimate gauze, according to Weir,¹³⁸_{Apr.} may be best made as follows: Dissolve 1 part sublimate and 2 of common salt in 500 parts water; soak the gauze in this for an hour, and then wring it

out and partially dry it in a clean room (not a hospital-ward or sick-room); keep it moist in glass jars. A little glycerin may be added if the gauze is likely to be kept some time.

Taylor¹⁵⁵_{Aug.} reports excellent results from the use of a dressing of gauze or cheese-cloth, kept constantly wet with a solution of sublimate of the strength of from 1 to 3000 to 1 to 6000.

An antiseptic ointment devised by Gottstein⁵_{May 5} consists of anhydrous lanolin, with which is incorporated sublimate solution of any desired strength, from 1 to 1000 to 1 to 5000.

An antiseptic paste, consisting of equal parts of zinc oxide and water, with which 5 per cent. of zinc chloride is thoroughly mixed, is recommended by Socin⁸²_{Sept. 21} as an application to small wounds. It is said to dry readily and to be unirritating.

Burchmore¹³⁹_{Jan.} recommends the use of closed glass coverings, like test-tubes, for parts injured or operated upon. The idea would seem to be, theoretically, very good, but, practically, to be, to say the least, inconvenient.

Rollins, of Auburn, Cal., has published¹_{Sept. 7} an illustrated description of an "aseptic suit," much resembling that worn by divers in their occupation, and intended to be put on by physicians over their ordinary dress when visiting cases of contagious disease. I must confess my inability to determine whether the proposal is intended in jest or in earnest.

Silk ligatures, as used by ovariologists, sometimes fail to remain quiet, and give rise to troublesome fistulæ or abscesses. Cases of this kind have been reported by Henley and others.¹_{Sept. 7} Davis thought the silk should be thoroughly cleansed of all fatty or oily matter before sterilization.

On account of the high price of surgical silk, Trendelenburg is reported by Heyder²⁶_{Mar.} to have employed with advantage hemp or linen thread, steeped for twelve hours in a 1-per-cent. sublimate solution, for sutures and ligatures. I have myself witnessed the entire disappearance of this material when buried in the tissues; it had, however, been carbolized, and not steeped in sublimate solution.

Meyer¹_{Mar. 30} confirms the ideas of Trendelenburg. He says the linen thread should be wound on a glass rod and soaked for twelve hours in a 1-per-cent. solution of sublimate, and then wound on a glass spool and kept in a 1 to 1000 solution of the same.

Several new methods of preparing catgut have been proposed.

In order to free it of fatty matter, Braaz¹⁰¹_{July} advises the use first of chloroform and then of alcohol, after which it may be stored in sublimate solution. Championnière¹²²_{Nov} recommends that it should be steeped for six months in a mixture of 20 parts crystallized phenic acid, 2 parts water, and 100 parts olive-oil; a few pebbles or bits of glass are to be put in so as to keep the catgut out of the water. For use, he thinks it should be soaked for a quarter of an hour in carbolized water, 1 to 20.

Benckiser³¹⁷_{Aug.3} suggests the sterilization of either catgut or sponges by dry heat, 265° to 285° F. (129.34° to 140.66° C.). The exposure should be, he thinks, for the space of an hour and a half or two hours.

Schapps⁵⁹_{July 13} advises placing the gut in a wide-mouthed, glass-stoppered bottle, and just covering it with ether; this is changed every day or two until it remains colorless and without impure scent. The gut may now be wound upon glass reels and kept in a 1 to 1000 ethereal solution of bichloride of mercury.

In view of the alleged uncertainty of sterilizing catgut, Fowler⁹⁶_{Dec., '88} advocates the employment of torsion or of silk ligatures for the control of hæmorrhage. When drainage is needed, he would use glass tubes, withdrawing them as soon as possible.

Landerer¹¹³_{May 12} proposes a dry method of operating antiseptically. From the moment of the first incision, the wound is mopped with sublimate gauze, the same being used to protect such portion of it as is not being dealt with. The procedure completed, the more important vessels are tied, and then a tampon is employed for a short time; on the removal of this the wound is found to be dry, and is sewed up, a moderately compressive bandage being then applied. Primary union follows. The advantages claimed for this method are avoidance of wetting and chilling the patient, less loss of blood, saving of time, and rapid and certain healing. In 90 cases so treated there was not one elevation of temperature or retention of wound-secretions.

Jordan Lloyd²_{Jan. 19} advocates dry dressings, using powdered boracic acid freely, both within and without. He objects to sponges on the ground that their absolute cleanliness cannot be insured. He does not believe healing is interfered with by the presence of some blood in a wound, saying that he has seen Gamgee "shut up freely-bleeding flaps" and still obtain primary union. He uses

drainage-tubes of rubber, leaving them several inches long, so that they may be withdrawn without disturbing the dressings.

Absorbable drainage-tubes made from the arteries of the ox have been proposed by Weeks,⁹_{June 1} and by Beyer,⁹_{Aug. 3}

Drainage of wounds by bundles of catgut is spoken of with approval by Cramer,⁶⁹_{Jan. 10} and by Thiem,⁶⁹_{Aug. 1}

Not a few surgeons regard all drainage as needless. Schmid⁴⁷⁵_{May} discourages it wherever thorough antisepticism can be secured. The same view is expressed by McGill,²_{May 18} by Boeckel,³_{May 8} by Chaput,³_{May 22} and by Malécot,²⁹⁰_{June 4}

In an article on the disinfection of the surgeon's hands, Pauschinger,³⁴_{Dec. 18, '88} after speaking in commendation of Fürbringer's method and reviewing the whole subject, refers to the complex formula for a sterilizing material suggested by Rotter, pronouncing it less adapted for the purpose just stated than for the cleansing of wounds and of the various cavities of the body.

Rotter,³³⁶_{Jan. 19} in a contribution on this subject, claims that in 114 cases, 1 of them a laparotomy, in which his preparation was used, it was perfectly efficient, and there was not a single instance of the slightest poisonous or irritant influence.

An earnest protest is made by Fürbringer,⁶⁹_{Nov. 29, '88} against the statement of Landsberg that the application of alcohol to the surgeon's hands is unnecessary, if they are washed with soap and water and then with sublimate solution. The question would seem to depend, in any given case, upon the thoroughness of the whole procedure.

I would suggest that there is another point which is of material importance,—the habitual state of the hands. If a surgeon takes no special care to be entirely cleanly except just when he is about to operate, and if he then goes through with the washing process in a perfunctory manner, he may use both alcohol and ether, as well as sublimate, without sterilizing his hands. My own experience leads me to think that a man who is constantly scrupulous about keeping his hands clean can, at any moment, make them as sterile as they can be made by a thorough scrubbing with soap and water, and then soaking them in sublimate solution.

Roux and Reynes,³_{Dec. 5, '88} assert that while, experimentally, Fürbringer's claims are sustained, they found clinically that absolute asepsis was effected in only 50 per cent. of the trials made. Yet

they think the method deserving of use as the best now available, especially in abdominal surgery.

Prout¹_{Feb.2} advises the use for the surgeon's hands of a liquid soap containing alcohol and glycerin, perfumed with any desired essential oil or oils. From its readier action such a soap will promote saving of time, while it is apt to be more efficient than those in solid form.

In order to prevent chapping and soreness of the hands of the surgeon from the constant use of antiseptics, Meyer⁴_{Jan.14} recommends either of the following ointments suggested to him by Liebreich: Lanolin (pure) 50 parts, vanillin 0.1 part, oil of roses 1 drop; or, lanolin 100 parts, liquid paraffin 25 parts, vanillin 0.1 part, and oil of roses 1 drop. After careful washing with a soap which makes a good lather, the hands are to be well rinsed and dried, and the ointment thoroughly rubbed into the skin.

A number of articles have appeared on the subject of the nail-brush as used in cleansing the surgeon's hands, some urging that it is indispensable, others that it may be a carrier of septic materials. It is certain that it answers a purpose which can scarcely be as efficiently attained by any other article; but it is equally certain that it should itself be frequently and thoroughly cleansed, just as any surgical instrument should be.

The important question whether a clinical teacher can occupy himself in pursuits which bring him in contact with septic substances without endangering the lives of his patients has been discussed by Kraske.³⁴_{Oct.29} He thinks the most thorough antisepsis can be attained, and cites in proof of this the fact that during the summer semester, while giving courses in operative surgery on the cadaver, he is often called upon to perform amputations, herniotomies, etc., and finds the cases do perfectly well.

From the same city comes a description, by Laguaite,¹⁰⁰_{Oct.31} of a surgical table which can be adapted to every species of operation, which allows all liquids to flow away without soiling either patient or surgeon, and which can be rendered thoroughly aseptic.

Wahlutuch⁷³⁸_{Jan.1} highly commends "wood bandages," made of strips of pine- or fir- wood, cut in short lengths, fitted and glued together, and properly lined, for orthopædic purposes; he thinks they might be employed to advantage in the modeling of splints for fractures, etc.

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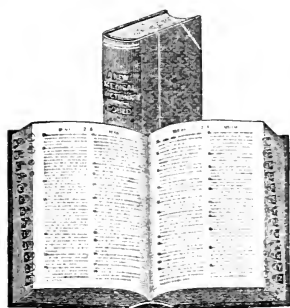
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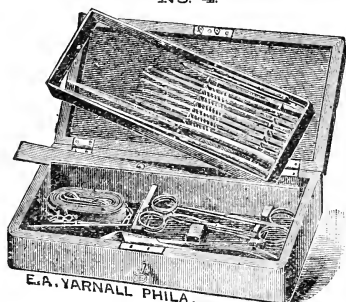
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- 2 Scalpels (different sizes),
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- 1 Curved sharp bistoury,
- 1 Tenaculum,
- 1 Aneurism needle,
- 1 Grooved director,
- 1 Spring forceps,
- 1 Amputating knife,
- 1 Small amputating saw (with movable back).

All of the above have metal handles, and are in a metal rack, which can be removed from the case and put into a solution with the instruments all in position. In the bottom of the box are—

- 1 Curved bone forceps,
- 1 Curved scissors,
- 1 Esnarch's tourniquet, with chain,
- 1 Nélaton's bullet probe,
- 2 Hemostatic forceps,
- 1 Straight scissors,
- 1 Pair silver probes,
- Needles, wire and silk.

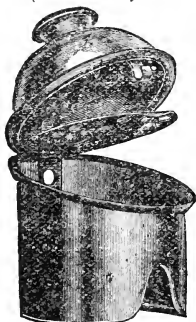
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The box is made of hard wood, polished inside and out, and with a movable metal tray, making a thoroughly aseptic and convenient case, the size of which is $10\frac{1}{4} \times 5\frac{1}{4}$ inches.

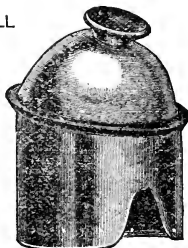
PRICE, NET, - - - \$25.00.

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(See *Journal of the American Medical Association*, May 10, 1890.)



E. A. YARNALL
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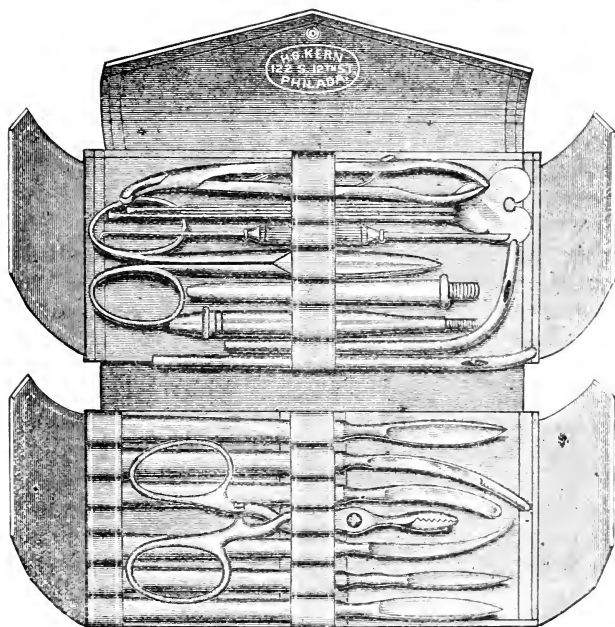
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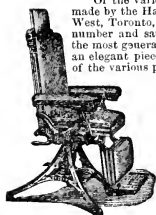
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THE INSTRUMENTS HAVE METAL HANDLES, NICKEL-PLATED, AND CAN BE PLACED
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40 PER CENT. DISCOUNT to Physicians on Surgical and Dental Instruments. 20 PER CENT.
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Of the various Surgical and Gynecological Chairs in use, the Harvard, made by the Harvard Co., at Canton, Ohio—branch factory, 67 Adelaide St., West, Toronto, Ont., owing to the ease with which it is operated, the large number and satisfactory positions to which it is adapted, seems to meet with the most general favor. It is made very strong and durable, and, withal, is an elegant piece of office furniture. The following illustrations show some of the various positions to which it may be adjusted.



A—Normal adjustment.



C—Full length reclining position.



B—For operations upon the eye, ear or throat.



G—For elevating the hips.



H—Three-quarter length reclining.



I—For operations on hand or arm.



F—Dorsal position.



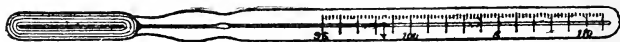
D—Reclining, with head lowered.



E—Sims' position.

THE BARRY TWIN HALF-MINUTE CLINICAL THERMOMETER.

FOR QUICK REGISTRATION OF TEMPERATURE.



PATENTED MARCH 25, 1890.

THE MOST SUBSTANTIAL, SENSITIVE THERMOMETER EVER OFFERED TO THE MEDICAL PROFESSION.

With the cold at 60° , and the heat (warm water) at 105° , when immersed will record it in less than 20 seconds.

The welding or joining the two in one, without any intervening space between, makes the bulb much stronger and the instrument less liable to break than any other of a similar kind heretofore offered.

It will also be found much more convenient to carry, as it takes up less room in a case or in the vest pocket. For these reasons, as well as its GUARANTEED ACCURACY, it is considered the favorite instrument for Physicians.

PRICE, \$2.00 EACH. For a short time only, Physicians will be sent a sample one, in case, at 25 per cent. discount, on receipt of the same, if they mention the "Annual of the Universal Medical Sciences."

FOR SALE BY ALL DEALERS.

JOHN BARRY, Sole Owner and Maker, 62 Fulton St., N. Y.

THE THERAPEUTIC VALUE OF BICYCLING.

SOME ten years ago a medical manual, referring to the bicycle amongst other hygienic appliances, favored "its claims on the attention of the practicing physician—first, as a prescription for convalescents and chronic, but not entirely disabled, invalids; and, secondly, as a useful instrument for the practitioner."

Time and practice have but confirmed this view in both its branches. Not only an increasing number of physicians have found the bicycle a help to themselves in their practice, but for many kinds of cases they have found it a useful thing to recommend for their patients as an aid to convalescence. In another aspect the lapse of time has verified the judgment of physicians passed many years ago, namely, that the supposed ills that might result from bicycling are found by experience to be practically wanting. For instance, experience has taught that there is no danger of hernia, nor of varicose veins, nor of weakening of the heart, nor of nervous irritability from the jar of riding, nor of glandular or genital disorders; but, on the contrary, that the habitual but not excessive use of bicycling has proved beneficial and helpful, even to patients suffering from such or similar affections.

Every physician has occasion often to prescribe, and even often to contrive, how he may induce his patients to take fresh air, sunlight, mental diversion, with bodily exercise, and every physician knows how valuable these are as restoratives. They are obtainable to different degrees with other instruments, but in certain things bicycling is different from horseback riding, boating, gardening, light gymnastics, home health-lift, and the like, in that it supplies good exercise, into which are called every muscle of the trunk and limbs of the body, quickening the circulation, strengthening the respiration, toning up the nervous system, stimulating digestion and secretion, and inducing sleep.

Aside from the fact of its giving an evenly-distributed exercise which wearies no part of the body more than another part, the valuable thing in bicycling, from a therapeutic point of view, is the mental exhilaration which accompanies it. To this ought also to be added, perhaps, the greater number of attractions or helpful diversions which may be enjoyed with it or by its means, and which are excelled by no other out-of-door exercise and recreation, unless it be yachting, which is much more expensive, and which is limited in locality.

HYGIENIC EXERCISE.

MEN who follow sedentary occupations and begin to feel increasing stiffness about the joints, or have chronic constipation, derive much good from cycling.—*Dr. Oscar Jennings, of England.*

To busy brain-workers the bicycle is a God-send; almost, if not quite, a necessity.—*Dr. Blackham, President of the American Society of Microscopists.*

THE wheel exercises the biceps, or arm-muscle, the flexors and extensors of forearm and fingers, the pectoral or breast-muscles, the shoulder-muscles, back, abdominal and lower limbs. Then the gentle motion prevents weariness, fills the lungs with fresh air, stimulates the tired and worn-out nervous system, rejuvenates joints, blood, and bone, and renders a new man of a rider in one week's riding.—*L. C. Toney, Asst. Surgeon U. S. Army.*

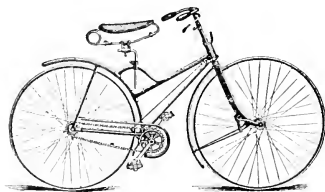
I AM of the opinion that no exercise for women has ever been discovered that is to them so really useful. . . . I shall rejoice to see the time when this exercise will be as popular amongst girls and women as tennis and the dance; for the more fully the physical life of our women is developed, the better for men as well as women. . . . The tricycle is, in fact, now with me not an uncommon prescription, and is far more useful than many a dry, formal, medicinal one which I had to write on paper.—*B. W. Richardson, M.D., F.R.S.*

TRICYCLE-RIDING, if not carried to excess and weariness, relieves brain-fatigue and incipient congestion of the liver; it eases the kidneys to act more freely and lightens the whole system; it banishes ennui and lowness of spirits, strengthens the whole muscular system, induces a free action of the skin, braces the nerves, and insures a healthful sleep.—*"A Family Doctor," in Cassell's Family Magazine.*

RAPID TRANSIT FOR PHYSICIANS.

THE feeling against the use of the bicycle by physicians in their practice is rapidly passing away, and we are confident that it will cease entirely as soon as its advantages are clearly appreciated. In speaking of the bicycle in this connection, we, of course, refer to the pattern known as the rear driver, or "Safety." Aside from the questions of health and pleasure—no small items of consideration to the busy physician—the one great advantage of the Safety bicycle is that it gives a means of rapid transit; it economizes time. Other points in favor of the wheel are, that it is easily mastered; it is inexpensive—after the first cost its maintenance being very little; it is always ready, an important point, particularly at night. Did patients appreciate how much more rapidly the doctor could come to their aid in cases of sudden illness, they would have no further prejudice against the bicycle. One more point may be mentioned: The bicycle is less tiresome than any form of transit with the horse for the motive power. From actual experience, we can say that we were less weary and more able to attend to what was at hand after riding fifty miles on a bicycle than after going the same distance in a buggy.—*Frank H. Potter, M.D., Ed. Buffalo (N. Y.) Medical and Surgical Journal.*

COLUMBIA CYCLES.



\$135.00.

SAFETIES

For Ladies and Gentlemen,

And a full line of

All kinds of WHEELS.

POPE MANUFACTURING CO.,

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BRANCH HOUSES:—12 WARREN ST., N. Y.; 291 WABASH AVE., CHICAGO.

HOMES FOR SPORTSMEN AND INVALIDS.

LANDS and Homes, on Lake Butler, near Tarpon Springs, Hillsborough County, Florida. Fishing, boating, hunting, freedom from malaria, cold weather, or severe storms. Lake Butler is a charming body of water surrounded by pine woods, and situated about 4 miles from Clear Water Harbor, an arm of the Gulf of Mexico. The lake is about 7 miles in length, with an average of $1\frac{1}{2}$ in width. It is on the shore of this lake that the Duke of Sutherland has erected his winter home, declaring that in all his many wanderings over the earth he has nowhere else found so enticing a situation. The tract of land containing Lake Butler and Tarpon Springs was the first selection made personally from the 4,000,000-acre Disston purchase, by Mr. Hamilton Disston and Governor Sanford. This statement gives an idea of its surpassing beauty and natural advantages.

The lake is of clear, pure water, well adapted for drinking purposes, averages from 10 to 30 feet in depth, and fairly swarms with black bass and other fish. The most indifferent fisherman can easily secure a liberal supply. To the true sportsman the fish in this lake will present special attractions, being exceedingly gamy, hard fighters and of large size—6 or 7 pounders, and even more being not at all rare. As high as 150 pounds have been taken by a small party in a few hours.

About 7 miles of lake front are now offered for choice homes in alternate lots of from 1 to 10 acres in extent. These fronts slope up gradually from the water, making charming places for homes, with rustic landings and boat-houses at the water's edge. By building on the higher ground a few hundred feet back and planting orchards of orange, lemon, guava, and other fruits, lovely homes can be made, where every charm that makes life sweet can be enjoyed. The climate is magnificent—an eternal spring.

The values of property around Lake Butler are rapidly advancing and it will soon be unattainable at reasonable prices, owing to its rapidly increasing reputation. No better place for making an investment or building a home exists.

Full particulars, maps, etc., upon application to the

OCCIDENTAL LAND CO.,

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GEORGIA BROMINE-LITHIA WATER.

NATURE'S GREATEST PRODUCT.

A SAFE and thoroughly reliable substitute for the *Bromides* in the treatment of *Neurasthenia*, *Insomnia*, *Nervous Prostration*, the *Morphine Habit*, *Dipsomania* and *Nervous Restlessness*, *Depression of Spirits*, *Nervous Headache*, and all forms of *Nervous Disorders*. A guaranteed *specific* for the many forms of *Eczema*, *Psoriasis*, *Scrofula*, and all phases of *Skin Diseases*.

Its wonderful combination of *Bromine*, *Iodine*, and *Lithia* renders it valuable, beyond all comparison, for *Kidney* and *Bladder Troubles* when complicated by *Nerve Troubles*. As a *Bath-water* it leaves the skin soft and velvety, and is refreshing and invigorating to the highest degree.

THE BOWDEN LITHIA SPRINGS COMPANY has received from N. A. Pratt, M.D., Consulting Chemist, of Atlanta, Ga., an analysis of the water contained in a spring recently opened within the Springs Park, about 100 yards from the famous Bowden Lithia Spring, so long and favorably known. The result of this analysis, *three times repeated*, will, beyond all reasonable doubt, revolutionize the administration, by the Medical Profession, of the *Bromides* in the treatment of the wide range of the protean forms of *Nervous Troubles*, and will demonstrate that nature has provided in the form of bright and sparkling water the *Hypnotic par excellence* of the world.

A very strong antagonism is being developed in the ranks of the medical profession to the indiscreet use of the Bromide of Potassium of commerce, and, while due allowance must be made for the natural divergence of opinion among these gentlemen, it is firmly believed that this water, just analyzed, will furnish the greatly-desired medium of *Anti-Nervous Medication* so long desired by physicians of all shades of opinion.

During the past two seasons the experience of many hundreds of guests at the Sweet Water Park Hotel, owned and controlled by this Company, and located at the Springs, has furnished the reason for an analysis of this water, so marvelously rich in bromine.

As in the case of many mineral springs, this Spring has been known as undoubtedly possessing mineral properties, but was not opened up for the purpose of drinking until May, 1877, and a small pavilion was then erected over it for the purpose of affording a resting-place for guests. The water was not drunk in any appreciable quantity for months after the Spring was opened, however, until claims were made by several physicians and guests that their inability to sleep had been overcome by drinking it, and that several who had been induced to try it, by their acquaintances, for cases of *Eruptive Diseases* and *Eczema* had not only received substantial benefit, but had been absolutely cured by it.

So marked had several of these cases become that, after persuasion by these physicians and guests, the Company was induced to have an analysis made for the purpose of determining satisfactorily the properties of the water, and the result marks an epoch in the history of *Natural Medicinal Mineral Waters*.

On the 25th of October, 1889, orders were received at the Springs from Mr. E. W. Marsh, of Atlanta, Ga., the principal owner of the interests in the Springs Company, to carefully gather from the Spring a sufficient quantity of the water with which to have made a quantitative analysis of it. Especial care was taken in securing a pure sample of the water, the Manager of the Company being requested to personally conduct its shipping. The result is here given in full, and the most careful attention is called to its characteristics as a GREAT NERVE SEDATIVE.

ANALYSIS BROMINE-LITHIA WATER.

GEORGIA GEOGRAPHICAL, MINING, AND CHEMICAL BUREAU,
16 FIFTEEN BUILDING,
ATLANTA, GA., NOV. 24, 1889 }

Result of ANALYSIS OF MINERAL WATER, received sealed, from LITHIA SPRINGS, GA., sent by E. W. Marsh, Esq., Atlanta, Ga., October 27, 1889, expressed in grains, per Imperial Gallon:—

TOTAL SOLID CONTENTS, - - - - 173.368

Combined as follows:

BROMINE {	MAGNESIUM BROMIDE, - - -	15.230	} 20.524
	POTASSIUM BROMIDE, - - -	5.294	
LITHIUM BICARBONATE, - - -			1.670
MAGNESIUM IODIDE—IODINE, - - -			.734
Strontium Sulphate, - - -			.280
Calcium Sulphate, - - -			20.210
Aluminium Sulphate, - - -			2.697
Sodium Chloride, - - -			121.490
Sodium Phosphate, - - -			.893
Silicic Acid (soluble), - - -			1.960

TOTAL SOLID CONTENTS, - - - - 173.368

The result, especially as to the large amount of BROMINE, was so unusual and unexpected, that I have repeated the analysis three times with practically the same result. I have made special determination for IODINE, and find as reported above.

N. A. PRATT, M.D., Consulting Chemist.

MEDICAL DEPARTMENT BOWDEN }
LITHIA SPRINGS CO., }
Lithia Springs, Ga., Dec. 1, 1889. }

In two years' experience here as Resident Physician, I had very frequently observed that all visitors and patients who drank this water experienced a drowsy sensation and slept remarkably well. Indeed, so marked was the effect upon some individuals suffering from Nervous Prostration, causing insomnia, that I have known them, after drinking this water a very few days, to oversleep,—often enjoying ten and twelve hours of refreshing sleep, and securing permanent relief.

It is needless to say how beneficial a water of this kind is to the vast army of sufferers from the so-called *Nervous Disorders*, among all of which *INSOMNIA* is the most prominent and distressing symptom.

Having observed the practical effects of this water in producing such refreshing and beneficial sleep, and its sedative action upon the nervous system of invalids and guests alike, I was not surprised to learn that it proved, upon analysis, to be unusually rich in bromine, and I am confident the water will become as famous as a sedative as your BOWDEN LITHIA WATER has become as a specific for Bladder and Kidney Troubles.

W. H. WHITEHEAD, M.D.,
Resident Physician and Director of Medical Dep't.

WALNUT LODGE HOSPITAL, }
Hartford, Conn., March 28, 1890. }

I have begun to use the Bromine Water sent me in two cases under my charge, and so far the results are very pleasing. I shall make an editorial note of it in the *Journal (Quarterly Journal of Inebriety)*, now in press. You have in this Spring a most valuable property, for the reason that both the water will come into demand and the Spring will become a great resort for the ever-increasing army of nerve-exhausted people who are ever seeking relief. I shall be pleased to give you all the aid in my power to make its value known, for I am convinced that it has great merit.

Believe me, yours most truly,

T. D. CROTHERS, M.D.,

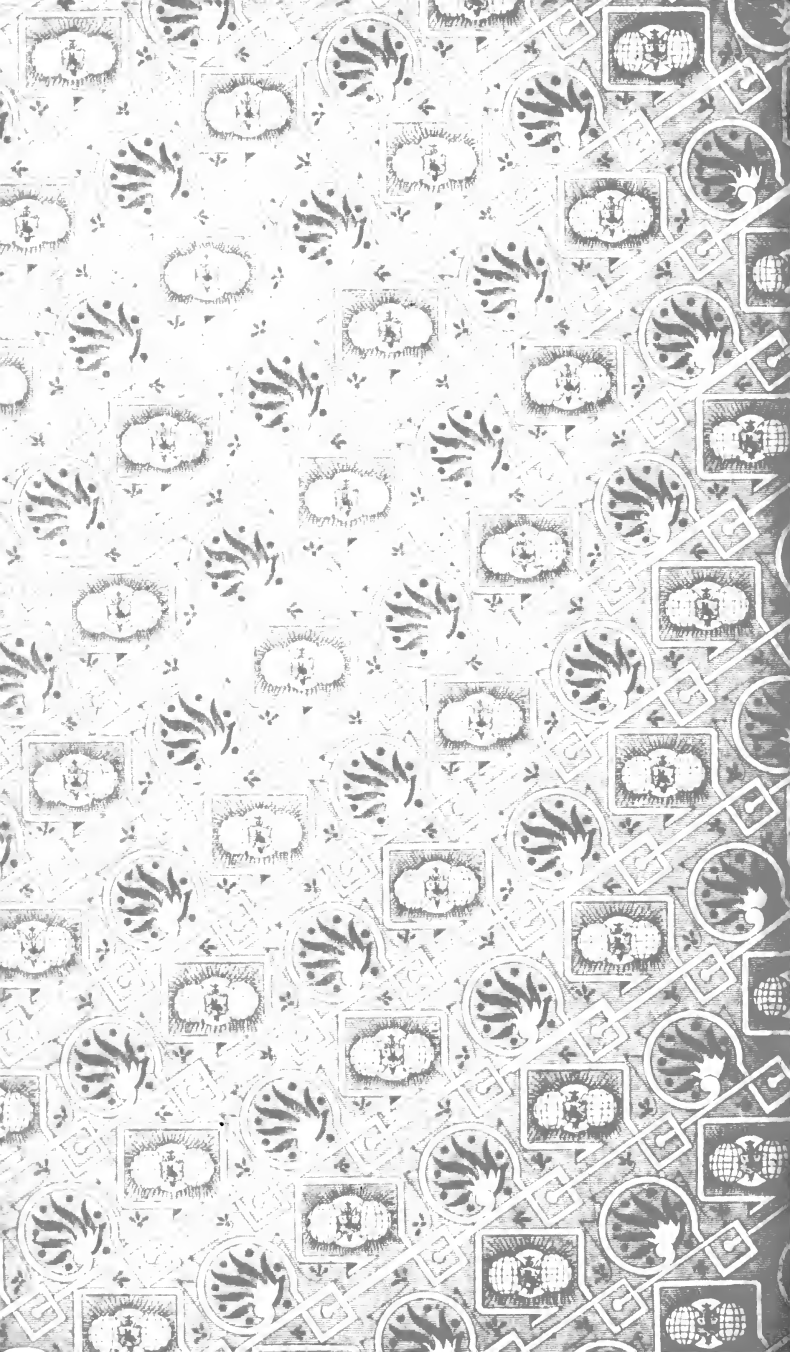
Editor and Sec'y "Quarterly Journal of Inebriety," and Supt Walnut Lodge Hospital.

A Pleasant Substitute for the Bromides.

THOMASVILLE, GA., }
November, 1889. }

The amount of BROMINE in the water, in its combination with other constituents of the water, as exhibited by the analysis, will be found a very pleasant substitute for the POTASSIC, SODIC, AMMONIC, BROMIC, and LITHIC BROMIDES which we are constantly called upon to prescribe in the various forms of nervous disease coming under our observation and treatment. T. S. HOPKINS, M.D.







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